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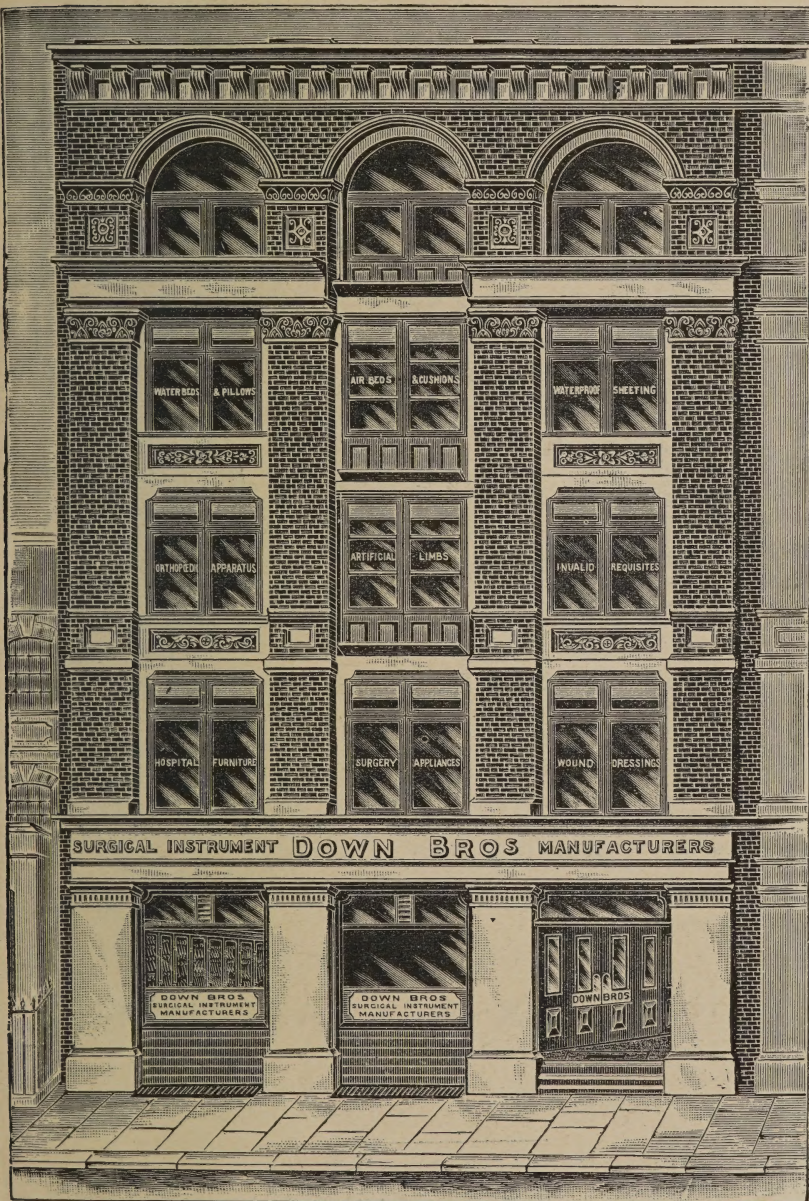


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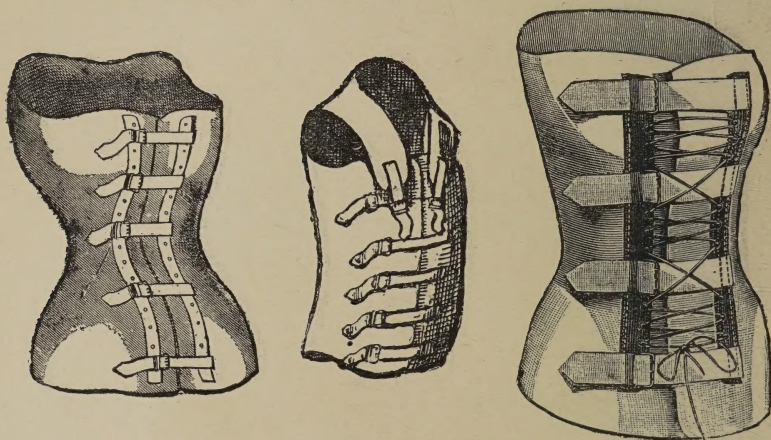
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TRANSACTIONS
OF THE
BRITISH
ORTHOPÆDIC SOCIETY

VOLUME III.
SESSIONS 1897 & 1898

PUBLISHED BY THE SOCIETY

Bristol :
J. W. ARROWSMITH, 11 QUAY STREET

1899

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 C. J. SYMONDS, M.S., F.R.C.S.Eng.
 A. H. TUBBY, M.S., F.R.C.S.Eng.
 VINCENT JACKSON, F.R.C.S.E.
 D'ARCY POWER, F.R.C.S.Eng.
 E. LUKE FREER, M.R.C.S.Eng.
 ROBERT JONES, F.R.C.S.E.
 WILLIAM THOMAS, F.R.C.S.Eng.

Treasurer :

C. R. B. KEETLEY, F.R.C.S.Eng.,
 56 Grosvenor Street, London, W.

Hon. Secretaries :

E. MUIRHEAD LITTLE, F.R.C.S.Eng.,
 40 Seymour Street, Portman Square, London, W.

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 28 Caledonia Place, Clifton, Bristol.

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LIST OF MEMBERS.

December 15th, 1897.—"Resolved that the Letters C.S. and T. be placed before the names of members who have served in the capacities of Member of Council, Treasurer, and Secretary respectively."

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	BAKER, H. F., F.R.C.S.E.	...	2 Mandeville Place, London, W.
	BENNETT, W. E., F.R.C.S.Eng.	...	27 Temple Row, Birmingham.
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C.	BRODHURST, B. E., F.R.C.S.Eng.	...	21 Portland Place, London, W.
	CARWARDINE, T., M.S., F.R.C.S.	...	16 Victoria Square, Clifton, Bristol.
C.	CLARKE, J. JACKSON, F.R.C.S.Eng.	...	9 Old Cavendish Street, London, W.
C.	EWENS, J., L.R.C.P.Lond., L.R.C.S.Ed.	...	17 Redland Grove, Bristol.
	FELLOWS, F. M., M.B., B.S.	...	The Grove, 75 South Town, Great Yarmouth.
C.S.	FREER, E. LUKE, M.R.C.S.Eng.	...	9 Newhall Street, Birmingham.
	GRIFFITHS, C. T., M.R.C.S., L.R.C.P.	...	9 Newhall Street, Birmingham.
C.	HOLLAND, C. T., M.R.C.S., L.R.C.P.	...	2A Prince's Road, Liverpool.
C.	JACKSON, T. VINCENT, F.R.C.S.E.	...	Waterloo Road South, Wolverhampton.
C.	JONES, ROBERT, F.R.C.S.E.	...	11 Nelson Street, Liverpool.
T.	KEETLEY, C. R. B., F.R.C.S.Eng.	...	56 Grosvenor Street, London, W.
	LEWIS, PERCY G., M.D.	...	22 Manor Road, Folkestone.
C.S.	LITTLE, E. MUIRHEAD, F.R.C.S.Eng.	...	40 Seymour Street, Portman Square, London, W.
	LLOYD, J. JORDAN, F.R.C.S.Eng.	...	Broad Street, Birmingham.
	MARTIN, A. M., M.B., B.S.	...	17 Saville Row, Newcastle-on-Tyne.
	MELSON, W. S., M.A., M.D., B.C.	...	29 Circus, Bath.
	MOXEY, V., M.R.C.S.Eng.	...	85 Carleton Road, Tufnell Park, London, N.
	MORGAN, D., M.B., C.M.	...	46 Nelson Street, Liverpool.
	MURRAY, R. W., F.R.C.S.Eng.	...	15 Rodney Street, Liverpool.
	NEWBOLT, G. P., F.R.C.S.Eng.	...	42 Catherine Street, Liverpool.
	NEWTON, R. A., F.R.C.S.E.	...	92 Newhall Street, Birmingham.
C.	OPENSHAW, T. H., F.R.C.S.Eng.	...	16 Wimpole Street, Cavendish Square, London, W.
	POLAND, JOHN, F.R.C.S.Eng.	...	4 St. Thomas Street, London Bridge, S.E.

C.	POWER, D'ARCY, F.R.C.S.Eng.	...	10A Chandos Street, Cavendish Square, London, W.
C.	REEVES, H. A., F.R.C.S.E.	...	7 Grosvenor Street, London, W.
	RIGG, S. E., M.R.C.S., L.R.C.P.	...	2 Varley Terrace, Liskeard, Cornwall.
C.	SMITH, NOBLE, F.R.C.S.E.	...	24 Queen Anne Street, Cavendish Square, London, W.
	SUNDERLAND, O., M.R.C.S., L.R.C.P.		Bexley Heath, Kent.
C.	SUNDERLAND, S., M.D.BruX., M.R.C.S. Eng.	...	11 Cavendish Place, London, W.
C.	SYMONDS, C. J., M.S., F.R.C.S.Eng.		26 Weymouth Street, Portland Place, London, W.
C.	THOMAS WILLIAM, F.R.C.S.Eng.	...	Great Charles Street, Birmingham.
C.S.	TUBBY, A. H., M.S., F.R.C.S.Eng.	...	25 Weymouth Street, Portland Place, London, W.
C.	WALSHAM, W. J., F.R.C.S.Eng.	...	77 Harley Street, London, W.
	WILLIAMS, G. C., M.R.C.S.Eng.	...	Mansion House Chambers, 12 Queen Victoria Street, E.C.
	WOHLMANN, A. S., M.B., B.S., M.R.C.S. Eng.	...	9 Gay Street, Bath.

Hon. Member :

C.	RAWDON, H. G., M.D., F.R.C.S.E.	c/o Dr. Christison, 22 Magdala Terrace, Edinburgh.
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Corresponding Members :

DR. JOHN RIDLON	103 State Street, Chicago, U.S.A.
DR. V. P. GIBNEY	16 Park Avenue, New York, U.S.A.
DR. ROYAL WHITMAN	126 West 59th Street, New York, U.S.A.
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Constitution and Rules of the British Orthopædic Society.

NAME, OBJECT, AND CONSTITUTION.

1.—The Society shall be called the “BRITISH ORTHOPÆDIC SOCIETY.”

2.—The Society shall consist of Ordinary, Honorary, and Corresponding members; and that the Honorary members be elected from time to time from Surgeons resident in the British Empire, and Corresponding members from among Surgeons practising abroad.

3.—The object of the Society shall be the advancement of Orthopædic Surgery.

4.—All Registered Medical Practitioners shall be eligible as members of the Society.

5.—The Officers of the Society shall be, Treasurer, two Hon. Secretaries (one from London and one from the country), and a Council consisting of nine members (four to form a quorum).

APPOINTMENT OF OFFICERS.

6.—The Hon. Treasurer shall be elected annually, and shall be eligible for re-election, and the Hon. Secretaries shall hold office for three years, except in the case of those first appointed, one of whom shall retain the office for four years. Of the Council one-third shall retire annually in rotation, and shall not be eligible for re-election during the succeeding year.

SUBSCRIPTION.

7.—The Subscription shall be half a guinea annually, payable in advance on the first day of November of each year.

ELECTION OF MEMBERS.

8.—Every candidate for membership of the Society shall be proposed in writing to the Council by two or more subscribing members having personal knowledge of him; such proposal shall be made not less than three weeks before a meeting of the Council, and if approved the candidate shall be proposed and his address and qualifications shall be submitted to the subsequent Ordinary

Meeting. The Ballot for election shall be held at the Ordinary Meeting the next after that at which the candidate was proposed.

9.—The mode of election shall be by ballot, one black ball in four to exclude.

NOTICE OF ORDINARY MEETINGS.

10.—The Hon. Secretaries shall give not less than fourteen days' notice of each Ordinary Meeting, setting forth the business to be transacted.

DUTIES OF HON. TREASURER.

11.—The duties of the Hon. Treasurer shall consist in having charge of the funds of the Society, in receiving sums due to it, and in paying such bills as are directed by the Council to be discharged under the signature of its Chairman; he shall make up and balance the accounts of the Society to the 1st of November in each year, showing the receipts, payments, and liabilities remaining undischarged. *At the last meeting in October the Society shall, on the nomination of the Chairman, appoint from those members who are not in office two auditors, who shall examine the Treasurer's accounts with the vouchers annexed, and deliver a written report on the subject to the Council at their first meeting in the ensuing December.*

DUTIES OF HON. SECRETARIES.

12.—The duties of the Hon. Secretaries shall consist in taking minutes of the transactions of the Society and of its Council, in reading these minutes at the commencement of each Ordinary Meeting, as likewise any letters or reports which may have been received, in presenting the necessary papers and documents to the Chairman, in sending notices to members of proceedings in which they are concerned, and in conducting any correspondence which may be directed by the Society. In performing these duties they are authorised to employ messengers, to prepay all postage, and to use printed forms.

MEETINGS OF THE SOCIETY.

13.—The Annual General Meeting of the Society shall be held in London early in December, and four Ordinary meetings shall be held in each year, namely (1) after the Annual General Meeting in December, (2) in February, (3) in May, and (4) in or near the first week in October, the precise date to be determined by the Council; one of the four meetings to be held in the country at a time and place to be determined by the Council.

VISITORS.

14.—Members may introduce visitors to the Ordinary Meetings of the Society, but the same visitor shall not be introduced oftener than once a year. Every member shall sign the attendance book at each meeting, and in this book the names of visitors shall be entered together with the introducers.

CHAIRMAN.

15.—The members present at the beginning of each meeting shall elect a Chairman by a show of hands.

SPECIAL GENERAL MEETINGS.

16.—A Special General Meeting shall be convened by the Council, either on the resolution of a majority of its own quorum, or on the written requisition of six members of the Society, whether members of the Council or not, a month's notice being given and the object of the meeting specified. No subjects shall be discussed at such meetings except those for which the meeting shall have been convened.

CONDUCT OF ORDINARY MEETINGS.

17.—Twenty minutes shall be allowed for the reading of a paper, and ten minutes to each speaker in any discussion which may arise.

ALTERATION OF RULES.

18.—No new rule shall be added and no existing rule shall be rescinded or amended except at a Special General Meeting convened by the Council, or on the requisition of at least six members, stating the precise nature of the addition or alteration intended to be proposed.

BYE-LAWS.

19.—The Council shall have power to frame bye-laws for the conduct of the Ordinary Meetings of the Society.

TRANSACTIONS
OF THE
BRITISH ORTHOPÆDIC SOCIETY.

Tenth Ordinary General Meeting,

Held in the Rooms of the MEDICAL INSTITUTION at
LIVERPOOL, on Saturday, June 5th, 1897.

Fourteen members and visitors were present, and Mr. THELWALL THOMAS was voted to the Chair.

A large number of most instructive cases was shown, amongst which were the following:—Four cases of congenital displacement of the hip, a case of tubercular disease of the knee, of infantile paralysis, of traumatic and of spasmodic talipes valgus, of genu varum, and many others.

Mr. TUBBY, commenting on a case of lobster-claw deformity of the hand, referred to his case which was published in the *Lancet* in 1893. In this case the genealogy of the patient was given, and it was found that the deformity had passed through five generations. Referring to a case of ganglion, he asked the opinions of those present as to its origin. He thought that in most cases it was due to a localised dilatation of the tendon sheath including the synovial membrane; but there could be no doubt that in other cases it was due to hernial protrusion of the synovial membrane, and possibly, in a third class of cases, to hypertrophy of the synovial fringes. He alluded to the work which had been done upon this subject by Mr. Martyn Jordan.¹ Mr. Jordan found that the best method of treatment was not excision, but by inserting a rather coarse exploring needle, withdrawing about half the contents of the ganglion, and then injecting five to fifteen minims of pure carbolic acid.

¹ *Lancet*, 1893.

Mr. NEWBOLT spoke of the value of excision, which he preferred to all other methods; but it was sometimes followed by weakening and expansion of the scar over the tendon, and in some cases a recurrent ganglion formed.

Mr. ROBERT JONES preferred pressure in most cases; and if this were not effectual, he inserted a fine tenotomy knife, allowed the fluid to escape, and then carefully scarified the interior of the cyst. After that he applied firm pressure, and in most cases the result was a cure.

Mr. THELWALL THOMAS spoke of cases of ganglion in which various methods had been carried out; and he had found on several occasions that he was not dealing with a tendon sheath, but with a diverticulum of the joint, which had come on after a sudden strain.

Mr. FREER preferred subcutaneous section of the sac of the ganglion all round, and, after evacuation of the fluid through the aperture, the application of a stout leather wristlet reaching nearly to the heads of the metacarpal bones in front and behind, underneath which a pad was placed to exercise pressure over the divided sac. This should be worn for a considerable time to prevent all movement at the wrist.

Mr. ROBERT JONES then gave an excellent demonstration, illustrated by numerous lantern slides, of Calôt's new method of reducing angular deformity of the spine. Mr. Jones spoke of the possible dangers of such cases, but at the same time he alluded to the successful results which are said to have been obtained in Calôt's clinic. Mr. Jones had recently been to Paris and to Berck, to see Redard and Calôt, and now gave the Society the results of his observations. Mr. Jones described the method adopted, and illustrated it by lantern slides. He pointed out that in the first place the patient was placed under an anæsthetic and then was put into the prone position. Forcible extension was then made on the head by the aid of a bandage properly adjusted, and then at least four assistants forcibly extended the spine by pulling on the limbs. The operator stood over the patient, then pressed downwards with considerable force if necessary on the prominence, which in some cases was felt to yield with a distinct crack and in others yielded slowly and quietly. When the operator thought that sufficient had been accomplished in this one sitting the patient was then suspended and put up in plaster. In many cases it was necessary to repeat this

operation, the projection being reduced more and more each time. Mr. Jones also quoted Redard's opinion that lumbar cases are more successful than dorsal and dorsal than cervical cases.

Mr. WILLIAM THOMAS said that he thought that this plan of treatment might have a successful issue, but in order to insure full success great care in the after-treatment would be necessary.

Mr. TUBBY spoke of the condition of the spinal cord in these cases, and asked Mr. Jones whether in his opinion the operation should be performed at the stage of softening or at the stage of bony ankylosis.

Mr. FREER said he had had the pleasure of assisting Mr. Robert Jones in some of his earlier operations by Calôt's method, and certainly the immediate results were most astounding, but it had yet to be seen how nature was going to fill up the gaps between the carious vertebræ thus formed. He did not like the principle of encasing the patient in plaster in the extended position on Sayre's pulleys, and should himself prefer Furneaux Jordan's plaster apparatus applied while the patient was extended horizontally by the assistants, or an arched Thomas's double hip-splint with headpiece.

Mr. ROBERT JONES replied, and discussed the various objections made, leaving the Society under the impression that good results might follow this treatment if it were carried out with proper care and precaution.

Mr. TUBBY discussed the causes of flexion occurring after excision of the knee-joint. He quoted the conclusion arrived at by Dr. Halstead, based on experiments, that the flexors exerted much increased force when once the knee was bent ever so slightly out of the perpendicular. This increase varied as the square of the number of degrees that the knee was bent. When flexion was once begun, the body weight tended to increase it. He thought that in very few cases of excision was a straight limb maintained for five years after the operation, and therefore he preferred erosion to excision, the only advantage of excision being that it was possible, by widely excising the joint-surfaces, to obtain access to the popliteal notch, and to remove from thence the diseased synovial membrane.

Mr. WILLIAM THOMAS challenged these remarks, and said that it was quite easy in an erosion to clear the popliteal notch of diseased tissues.

A vote of thanks was then passed to the Liverpool members for the manner in which they had entertained the Society, and another to the Liverpool Medical Institute for lending the room.

The meeting then closed.

Eleventh Ordinary General Meeting,

Held at the NATIONAL ORTHOPÆDIC HOSPITAL, GREAT PORTLAND STREET, LONDON, W., on Friday evening, November 5th, 1897; Mr. MUIRHEAD LITTLE presiding.

Fourteen members and visitors were present.

The minutes of the last ordinary meeting were read and confirmed.

The Report of the Sub-Committee on Transactions was submitted by Mr. TUBBY. It was, he said, practically the Report made last year, and the question to be considered was whether they would accept it for the present year also.

Mr. NOBLE SMITH moved its adoption, remarking that he considered it most important to have the *Transactions* published.

Mr. TUBBY stated that he had seen the balance-sheet for the current year, and with the funds in hand the publication of the *Transactions* would leave the Society solvent.

A suggestion by Mr. VINCENT JACKSON, that instead of the one bound and twenty unbound copies sent last year to members fewer copies should be distributed, was replied to by Mr. LUKE FREER, who stated that the additional copies would only involve an extra expenditure of £1, which it was worth their while to incur as many of the members wished to send copies to friends.

Mr. TUBBY further stated that the 5s. contributed by each member must in no way be considered as covering the extra cost, that being met by sundry legitimate advertisements which could only be secured on condition of a certain circulation.

Mr. VINCENT JACKSON thereupon seconded the adoption of the Report, which was carried unanimously.

Dr. Percy G. Lewis (Folkestone), Mr. A. Martin (Newcastle-on-Tyne), and Mr. H. F. Baker (London) were elected members of the Society.

Mr. NOBLE SMITH intimated that the Committee of the City Orthopædic Hospital would be pleased to grant the use of their Board-room for the next meeting of the Society.

Mr. JONES (Liverpool) moved, and Mr. VINCENT JACKSON seconded, a motion that the Committee of the Hospital and Mr. Noble Smith be thanked for their invitation, and that the Society accept the same.

The CHAIRMAN suggested that the discussion on Fibrous Ankylosis, which had been postponed for several meetings, and which they were not likely to reach that evening, be taken at the December meeting.

This having been seconded by Mr. W. THOMAS, was agreed to.

In the absence of Mr. Reeves, his House Surgeon showed, on his behalf, three cases. One was a boy with dislocation of the left hip, double congenital equino-varus and paralysis of both tibial groups of muscles. Mr. Reeves was anxious for the opinion of members as to whether the dislocation should be regarded as congenital, as he himself was inclined to believe, or whether it should rather be deemed paralytic. The history of the case could not be got with certainty, the parents being hardly ever sober. The left foot had been operated on during the child's infancy, and the right foot at the age of 4; but no history of these operations could be ascertained.

The second case was that of a child with extreme equino-varus on the left side, with extreme deformity; there was also congenital defect of the tibia and deformity of the foot. The right foot had been amputated. With regard to the left, Mr. Reeves first excised the astragalus, and was thus able to correct the deformity. He divided the tendo Achillis and got rid of the scaphoid. The scaphoid, astragalus, and os calcis were so welded together as not to be separately distinguishable.

The third case shown, along with a skiagram, was apparently one of congenital fracture *in utero* of the tibia and fibula, with malformation of the hip. It might be a case either of rickets *in utero* or fracture *in utero*.

Mr. TUBBY said the first case seemed to him one of congenital dislocation. Although the condition had existed apparently for so long, there was no reaction of degeneration. If it had been a paralytic dislocation, he would have expected,

with so long a history, more wasting of the muscles and certainly reaction of degeneration.

Mr. MUIRHEAD LITTLE agreed with Mr. Tubby as to the paralysis. From what he had seen and read of cases of paralytic dislocation of the hip, he would expect paralysis of the muscles round that joint. In the case shown there did not seem to be any marked paralysis there; it was further down, and not so extensive as in undoubted cases of paralytic dislocation.

Dr. RISIEN RUSSELL said that his experience of infantile paralysis would have led him to expect much more atrophy and certainly altered electrical reactions in the case shown if it had been one of this kind. Without alteration of the electrical reactions he would hesitate to diagnose paralytic dislocation.

Mr. REEVES'S HOUSE SURGEON remarked that in the case with imperfect development of the tarsus it was impossible to say what had been removed. Besides the astragalus, part of the scaphoid certainly, and possibly part of the os calcis, had been taken away; but so impossible was it to distinguish the separate bones, that it was as little possible to be definite on the point. Mr. Tubby had stated in his book that such an operation was unjustifiable; and Mr. Reeves was anxious to obtain the opinion of the members as to whether it was justifiable in the case shown.

Mr. NOBLE SMITH thought it difficult to express an opinion on that point, as they had not seen the case in the first instance. So, too, was it difficult to come to a conclusion as regarded the first case, from the inability to obtain any history.

Mr. TUBBY showed a boy, aged 9, who had an acute attack of infantile paralysis while in India. When he first saw him the boy showed marked signs of the attack: he had a bad paralytic scoliosis, while both lower extremities were in an extremely flail-like condition. With regard to the scoliosis, he did not think much improvement could be looked for. He decided to perform arthrodesis of both ankles in preference to other measures. He did not much care for arthrodesis in the case of the knees, since it was possible to control them by means of simple apparatus; but in the cure of the ankles, arthrodesis was an excellent measure for avoiding very heavy and expensive apparatus. He, therefore, in this case, performed the double operation. It was not fixation, but some-

thing short of that, which should be aimed at. To get the best result there ought to be about 10 degrees of movement at the ankles. In this case he had succeeded in getting, not entire fixation, but sufficient to render the joints stable for walking. With regard to the joint surfaces, he had carefully cut away all the cartilage and with a semi-circular gouge stippled the bone in regular lines, making about forty or fifty stipplings on each joint surface. The case, as an example of infantile paralytic spinal curvature, he remarked, was the severest he had seen.

Mr. JACKSON CLARKE asked whether the electrical reaction of the muscles of the spine had been taken, and whether the erector spinæ was affected at all. With regard to the ankles, he thought that on the right side complete ankylosis had resulted from the operation, what movement there was being in the tarsal joints. On the left side there was certainly a little movement at the ankle. He had several patients with as great an amount of paralysis of the lower extremities going about fairly comfortably with instruments alone; and he found that after the instruments had been applied, giving a fixed joint at the ankle and knee and a free joint at the hip, the hip muscles developed considerably. He was not inclined, from his experience hitherto, to practise arthrodesis. Instruments could be made, strong and light at the same time, by means of which patients could get about comfortably without undergoing any serious operation.

Mr. MUIRHEAD LITTLE thought such cases, like so many other orthopædic operations, largely a question of expediency. In many cases better results could be got with instruments; but if they knew the case was one in which instruments would not be applied regularly, and in which there would be relapse into as bad a state as before, they might go in for a radical cure even although it might not produce as good a result as instruments might have effected.

Mr. ROBERT JONES said he had performed a very large number of arthrodesis operations—between fifty and sixty perhaps—and had published details of about twenty. His experience of the operation was a distinctly favourable one. Some cases did tend to recur. Unless great care were taken over the operation they got to walk on the inner or outer side of the leg, and instrumental support was necessary for quite a long time. He agreed that it was very much better to have a little movement at the ankle joint than to have it absolutely stiff; indeed, in the case of the ankle it was very difficult,

without taking away a great deal of bone, to get bony ankylosis. He thought that generally excision by the front was best, especially where the paralysis was complete. The muscles in front of the joint were cut across and no trouble arose. Where a little power remained in the gastrocnemius and calf muscles, and where, in spite of that, there was still talipes equino-valgus, it was better in certain cases to do an arthrodesis, cutting the tendo Achillis and stitching it up. The rapidity with which these cases united was marvellous. In paralytic cases they seemed to unite more quickly and safely than in joints not deprived of nutrition.

Mr. TUBBY, replying to the points raised, said that the left erector spinæ certainly showed the reaction of degeneration. With reference to the question of instrumentation or operation he thought that, as surgeons, they were anxious to emancipate themselves from instrument makers, and it was important to recognise the merits of arthrodesis from this point of view. As for movement, he had watched the case for a long time and he believed there was movement at the ankle, and not only at the medio-tarsal joint, although it was difficult to distinguish between them. With reference to the desirability of preforming excision at the knee as well, he had seen some such operations and his experience had not been favourable.

Mr. THOMAS, not being able to show his patient, read some notes on the case and showed a photograph. The case was one of great interest, involving, as it did, a trial in court in which men of considerable reputation totally differed in opinion. The patient, a man about 55, applied at the Orthopædic Hospital on March 3rd, stating that on December 28th he had fallen and hurt his back. At that time he did not give any exact particulars about the accident. On examination lordosis was found in the lumbar region, with flat spine above and a very marked angle between: there was also a certain amount of rigidity. A month later when the patient again came, his medical attendant said he was going to commence an action against the railway company. The action was interesting, not only on account of the spinal business, but also because of the defence set up. The man had suffered for years from asthma; but there was a difference of opinion even about that. The contention of one side was, that whatever deformity existed was entirely due to asthma, and that there was no angular curvature at all. On his second appearance the man stated that he had fallen backwards in getting out of a railway carriage, with forty pounds of newspapers strapped

to his back, the carriage having been stopped short of the platform in a tunnel. He had much pain in his left hip, felt sick and found that he walked with difficulty. He stayed at home for two days under treatment. Since that time, he said, he had suffered great pain, which varied in position—sometimes in the hip, sometimes the loin, and sometimes the shoulder. There was a marked angular projection opposite the ninth and tenth dorsal vertebræ, with tenderness and rigidity above and below. These were the principal symptoms at that time. Mr. Thomas ordered him a spinal vest with a moulded Swedish iron splint—an excellent application in these cases, giving immediate relief—which to some extent remedied the deformity. On June 25th the angular projection was more rounded; the vest had given much relief. The patient looked shorter, measuring 5ft. 5 $\frac{3}{4}$ ins. On July 30th he was much the same, but had lost half an inch. Every precaution had been taken to secure accuracy in measurement. He complained then of some cramps in his hand. On July 23rd he was seen by two surgeons and a physician in consultation on behalf of the railway company, as well as by his medical attendant and Mr. Thomas. The railway company's officers thought he had certainly sustained some injury to his spine, but that he was then suffering from neurasthenia which was sufficient to account for his symptoms, while whatever deformity there was resulted, they said, from the asthma. On July 27th he seemed somewhat better and a little fatter. All were not agreed that there was some angular curvature opposite the ninth and tenth dorsal vertebræ, exaggerated knee-jerks and girdle pains. There was also rigidity. Mr. Thomas had no doubt about the case and was surprised at the difference of opinion. A friend to whom he took the patient thought there was no angular curvature. The man got his verdict, but whether there was an angular curvature or not the future would no doubt decide. Mr. Thomas had not lately seen the patient, who seemed positively to have avoided him.

Mr. Thomas also exhibited a skiagram representing an injury to the epiphyseal line of the radius, with subsequent arrest of the growth of that bone, the ulna continuing to grow. Twelve months before the skiagram was taken the patient, aged 20, sustained some injury to the wrist—whether a fracture, a sprain, or what it was Mr. Thomas had not been able to make out. What the deformity was could, however, be clearly seen.

Mr. ROBERT JONES said the skiagram of the hand was rather suggestive of Colles's fracture, met with in the case of

children. In it there was a distinctly different level between the two bones. It would be interesting, he remarked, to have a photograph of the hand twelve months hence, to see if the growth-rate still varied. The characteristic prominence of the ulna on the inner side, so generally seen in Colles's fracture, was interesting, as was also the fact that, in spite of the apparent growth not being equal, there was no abduction of the hand. With a shortened radius, that might be expected as a marked feature. It would be interesting, too, to see what the lateral movement was. With regard to the other case, he would be inclined to lay more stress on rigidity than on the condition of the curve. It would be important to know whether, on bending forward, backward, and sideways, there seemed to be fixation in the area of the curve.

Mr. NOBLE SMITH thought it would be desirable also to know whether the angle appeared immediately after the accident, and whether it had increased since. The symptoms certainly were indicative of injury.

Mr. THOMAS replied that he thought an angle was noticed at first, but it certainly increased. When he first saw the case, on March 3rd, there was a slight but perceptible angle, which on April 20th was increased. Then an apparatus was applied which prevented its further development, causing it to become rather rounded. His own opinion was that there had been crushing or injury to the bodies of the vertebræ and intervertebral substance, in consequence of which there was shortening in front to a slight extent and projection of the spine behind, forming an angle. There was no doubt about the rigidity, but he thought he could sometimes move it a little. The rigidity was musculo-spinal. He tested the rigidity with three fingers, and it answered completely.

A CASE OF FLAT FOOT.

BY MR. J. JACKSON CLARKE.

The patient, a girl aged 10 years, has naturally long feet, which are further elongated by the characteristic displacement of the bones.

The footprint shown shows this feature, and also the replacement of the natural hollow of the inner border by a convexity.

Mr. Clarke showed in illustration of this case:

1.—Footprint from a case of flat foot. A skiagram taken for me by Coxeter, with the left foot placed with the sole

upon the plate, the right resting on its outer border, shows that the scaphoid bone has suffered displacement to a greater degree than any other member of the tarsus. It also shows that the outer arch is flattened by the downward displacement of the cuboid bone.

2.—Skiagram of flat foot. The right foot was taken in lateral, the left in dorso-ventral view.

Mr. NOBLE SMITH thought that the best treatment for such cases was to force them, under an anæsthetic, into as good a position as possible, fix the part in plaster of Paris, and retain it so for a fortnight, then remove the bandage and use force again. If the patient could be kept lying up from four to six weeks under this treatment good results were obtained.

Mr. LUKE FREER agreed with Mr. Noble Smith as to the treatment of these cases, but instead of putting them in plaster of Paris he put them up with a boomerang splint on the outside, a splint curved on the flat, so as to keep the foot in the position of equino-varus for two or three weeks. He preferred the Holland's arch to the india-rubber or cork pad. This spring arch was, to his mind, more satisfactory, as it did not cause horny thickening of the skin. The treatment should be combined afterwards with exercises to develop the calf and the inner muscles of the leg.

Mr. W. THOMAS said the principles which Mr. Freer and himself adopted were practically the same. Occasionally he did put them up in plaster, which he thought gave the best results. He entered a protest against the operation known as Ogston's, which seemed to him so totally unsurgical that he wondered it ever suggested itself. He thought no case ought to be abandoned until the patient had got a fair arch; certainly the development of the body itself improved the arch if too much weight were not put on it. Many of the patients had to get about to earn their living; but where they could be kept off their feet very good results were obtained.

Mr. JACKSON CLARKE said he had used plaster in some cases. It was largely a question of the circumstances of the patient in deciding what procedure to follow in any particular case. He had shown at the North-West London Society a boy who came to him with one foot flat and the other normal. In that case he prescribed the tiptoe exercise, and had the patient—a very intelligent boy—practise it before him. A week later the foot which had been normal was, after the performance of the exercises, decidedly flattened and the limb

cold and congested. He had taken the boy's foot in his hand, and, with very little pain to the boy, reduced it to its normal position. This case he fixed in plaster, and ordered it to be rested for a fortnight. That, then, was a case where acute flat foot was developed during the performance of the regular exercises, illustrating how impossible it is to prescribe any one method of treatment for all cases, and how necessary it was to study each particular case.

Mr. NOBLE SMITH, in a paper on "Spasmodic Torticollis," gave the details of several cases.

In 1891 Mr. Noble Smith operated on a lady patient, he performed neurectomy of the external division of the posterior branches of the second and third cervical nerves on both sides for spasms in the splenius capitis of both sides, and subsequently in the spinal accessory of the left side.

In 1892 he operated on a lady, over 70 years of age, sent to him by Sir William Gowers, who suffered from severe spasms in the left sterno-mastoid, as well as in the extensors of the head, the head being thrown backwards and forwards in the most violent manner. An absolute cure resulted.

In 1893 he entirely relieved the spasms in a lady, by dividing the spinal accessory.

The next case was that of a lady entirely cured by operation on the spinal accessory and posterior cervical nerves of the opposite side.

One remarkable case was that of a girl, aged 16, who suffered from general chorea as well as torticollis. She had caries in the upper cervical vertebræ. He attributed the torticollis to the irritation from the caries. He treated her by means of a fixation apparatus; the caries got well, and her general choreic movements entirely disappeared, but there remained definite spasm on the left side. He waited a considerable time, trying various remedies, and at length concluded to divide the spinal accessory, which relieved her to a great extent. Some months later he excised pieces of the cervical nerves on the right side, from which cure resulted.

In 1894 he performed neurectomy of the left spinal accessory, and the second, third and fourth cervical nerves on the left side, in a man about 50, who was in such a bad condition that he had contemplated suicide. These operations were followed by cure.

In October, 1892, a patient, in so distressed a condition that he was unable to go to America on business, was enabled by the relief afforded by division of the spinal accessory to

carry out his intention, and he had never felt it necessary to have a subsequent operation, the remaining spasms being so slight.

After great persuasion, a lady, about 40 years of age, who was highly neurotic, submitted to division of the spinal accessory. She was a very obstinate patient, and, although the muscle was entirely paralysed, she declared she has had no benefit and would not undergo another operation.

Proceeding, Mr. Noble Smith said that, although it might be assumed that failures to completely cure might occur, yet the operation was a well-established one, and ought to be performed when more simple remedies had been tried and failed. The cases he had cited varied in their duration from three to sixteen years.

Mr. Noble Smith then discussed some scientific points in relation to the operation. He referred to a very interesting paper lately published in the *British Medical Journal* by Dr. Risien Russell, the outcome of experiments, and the results were of value. Dr. Risien Russell, however, assumed that division of the spinal accessory would not stop the spasms in the sternomastoid, because that muscle was supplied by other nerves. This statement did not coincide with his (Mr. Noble Smith's experience), since in all the cases he had quoted there had been absolute paralysis of the muscle. The other nerve-supply did not seem to have any connection with the spasms, and need not deter the surgeon from operating. Division of the spinal accessory might safely be expected to be followed by paralysis of the muscle. Dr. Risien Russell went on to say in his paper that he did not think it likely that in a case where there were general spasms, cure would result from operation on the spinal accessory alone, but that it would be necessary also to divide the posterior cervical nerves. With that statement he (Mr. Noble Smith) quite agreed; but the division of the posterior cervical nerves had to be on the opposite side, not on the side of the fibres connected with the affected sternomastoid. The rotators, in these cases, were on the other side, so that in operating on these nerves one was not interfering with the fibres referred to by Dr. Risien Russell.

Mr. TUBBY, speaking of the spinal accessory, had stated that immediately the nerve was resected the sternomastoid and trapezius were paralysed, but that the head did not become straight at once owing to the shortening which had taken place in other muscles. In the eleven cases he had cited

that evening he had not met with anything of the kind. Mr. Tubby's further statement, also made by other surgeons, that it was necessary to use an artificial muscle, was likewise not in accordance with what he had found. He had himself never used an artificial muscle, and as soon as the spasms stopped there had never been any trouble. Sir William Gowers had stated that the fact of many muscles being involved made it probable that the muscular contractions depended, not on over-action of the nerve cells, but on irritation of the nerve fibres. But we do not know what nerve cells are primarily deranged.

Mr. CAMPBELL DE MORGAN's case seemed to be one of a different kind from any other recorded. In it all the muscles of the face and head were in action, something however like one of the cases he had quoted; but in Campbell de Morgan's case entire relief was obtained by operation on the one spinal accessory.

It had been suggested that there was great loss of power after this operation, and that if one sternomastoid was paralysed, deformity would result in the opposite direction from the action of the antagonistic muscles. Of this he had himself seen nothing. The cases quoted did not necessitate treatment for any great length of time afterwards, nor had there been any want of power. The case in which he had divided most nerves was that of the old lady over 70, in whom he had divided the posterior cervicals on both sides, as well as the spinal accessory on one side. She felt a certain amount of weakness for a few weeks; two months later, having meanwhile been at the seaside and improved in health, she only had a little weakness in the neck, but this was so slight that she would not have mentioned it, she said, had she not been questioned on the point. She said she was gaining strength every day, and felt no inconvenience whatever.

Dr. RISIEN RUSSELL said the experimental results detailed in his paper to which Mr. Noble Smith had referred were obtained in monkeys. The neural canal had been opened, laying bare the nerve roots before their exit from the canal; the posterior nerve roots were divided, but the anterior roots were left intact, except in the case of a few control experiments. The anterior roots were then stimulated individually, care being taken to prevent spread of the current. After dividing the spinal accessory nerve, well-marked contraction of the sternomastoid was invariably produced on excitation of the first and second cervical nerves; while, in certain cases, stimulation of

the third cervical also gave response in certain portions of the muscle. The results were so different in many cases from those usually given in the anatomical books, that it seemed worth while to draw up a table contrasting the results he obtained in the monkey with those in man as stated in Quain's *Anatomy*. His investigations were first undertaken in connection with the subject of wry-neck. Unlike Mr. Noble Smith, he had been singularly unfortunate in the results he had seen from section of the spinal accessory for the relief of wry-neck. To begin with, the cases were rare in which the spasms were limited to the sternomastoid muscle. Other muscles were usually also involved, so that section of the spinal accessory, while possibly arresting spasm in the sternomastoid, could not be expected to arrest it in the other muscles. Therefore the operation which, like Mr. Tubby, he believed to have been devised by Gardner and afterwards practised by Keen seemed preferable. Further, he had gone on to say in his paper that a muscle which, like the sternomastoid, had a double nerve-supply could hardly be expected to cease from a condition of spasm altogether after only one of the paths by which nerve impulses could reach it had been divided. Mr. Noble Smith himself, quoting Sir William Gowers, with reference to the pathology of wry-neck, had said that it was a central disturbance. Had it been a peripheral condition of the spinal accessory nerve, one could understand mere division of that nerve relieving the spasm permanently: but it was a central condition and one in which a group of muscles centrally represented was involved; the mere severance, therefore, of one path to one muscle could not be supposed to cause a cessation of spasm in the whole group. Further he might say that, from the clinical point of view, he had seen cases of wry-neck hysterical in nature which were extremely difficult to distinguish from the true variety. One could well imagine a condition of hysterical wry-neck resulting in cure from operation on the spinal accessory nerve, while the genuine form of torticollis would not. He thought it possible that this might explain some of the discrepancy—he did not say all—in the results that had been obtained by different surgeons.

Mr. TUBBY, speaking with reference to the question of priority, said it seemed to him not a question of priority of publication, but one of priority of operation; and, inasmuch as Dr. Gardner's first operation was done in 1888, he took it that that gentleman should have the priority. He asked, firstly, if Mr. Noble Smith divided the spinal accessory

before or after it entered the sternomastoid; secondly, did he resect a portion of the nerve or divide it; thirdly, what were his anatomical guides to the position of the posterior nerve roots, and how near the vertebral column had he divided them and what were the immediate results afterwards? He added that in an interesting case of torticollis secondary to suppuration of the cervical glands and irritation by the scar, he had removed the scar and with it quite an inch of the spinal accessory. A good deal of the spasm about the sternomastoid disappeared, but he could not say that the spasm in the posterior muscles was relieved.

Mr. THOMAS said he had done three cases of division, or *excision*, of the spinal accessory, operating in each case from the front of the sternomastoid muscle, turning it back and finding the nerve very easily. To him the best guide appeared to be the angle of the lower jaw, which it was almost exactly opposite. He had not been able to trace the subsequent results, but for a few months he knew they were very good.

Mr. JACKSON CLARKE said he had had the privilege of assisting Mr. Noble Smith in one of the operations, and had taken away the bit of nerve cut off, about three-quarters of an inch long. A recent paper of Mr. Victor Horsley's, he said, bore on the subject. Mr. Horsley recommended the same operation, namely, excision of a piece of the spinal accessory nerve before it enters the sterno-mastoid and excision of the posterior dorsal nerve roots on the opposite side. Mr. Horsley gave directions for getting at the first nerve—the suboccipital. He boldly scoops out all the contents of the suboccipital triangle *minus* the suboccipital artery. As there were a good many veins there, it meant a good deal of hæmorrhage. Mr. Jackson Clarke thought that, in the majority of cases, it would be sufficient to excise the posterior branches of the second, third, and fourth nerves.

Mr. ROBERT JONES said he had performed the operation three times, in each case excising a portion of the spinal accessory. One was that of a woman who had wry-neck for three years; and in that the result was very good. The other two returned in less than six months.

Mr. T. VINCENT JACKSON said his experience was limited to one case—that of a man with wry-neck on the left side, in whom, three years ago, he had excised a portion of the spinal accessory nerve on the vertebral side of the muscle. A good half-inch was removed. When the man left the hospital he

was perfectly comfortable, and the deformity had ceased; but in less than twelve months he was in a worse condition, according to his own account, than before operative procedure.

Mr. NOBLE SMITH, in reply, said that he had from the first operated upon the nerve from the front towards the face, making an incision from the mastoid process downwards for about two or three inches, having generally to enlarge it a little, and working down behind the sternomastoid till he came upon the nerve. The position at which the nerve entered the muscle varied a good deal; but it was desirable to cut the nerve before it entered the muscle. He had excised from a third to three-quarters of an inch. It was difficult to get much more without taking more trouble than was warranted, because the nerve retracted each way when cut, and separated double the distance of the amount excised. With regard to the posterior cervical nerves, he had made an incision about three-quarters of an inch from the central line of the spine—from the occiput downwards. He had cut straight down, separating the muscles, till he came down upon the spine. The difficult point was to get under the splenius capitis, which in each case seemed to have been the muscle most, if not alone, in spasmodic action. He had separated the muscle from its deep connections; looked for any little fibres entering it, and divided them. He had even got so far under this muscle as nearly to approach the sternomastoid. He had hitherto confined himself to taking out pieces of the second, third, and fourth spinal nerves. In the first case he had intended to get the suboccipital nerve, but he had found so many veins in that position that he had abstained from proceeding. The result, however, was satisfactory. Where the spinal accessory alone had been divided he had always warned the patients of the possibility that a second operation might be necessary.

COXA VARA IN INFANTS.

PAPER BY MR. J. JACKSON CLARKE. Nov. 6th, 1897.

The earlier writers on coxa vara—Müller and Hofmeister—described exclusively cases of bending of the neck of the femur in adolescents. Lauenstein¹ appears to have been the first among recent writers to identify the condition in a child.

¹ Lauenstein, "Bemerkungen zu dem Neugungswinkel des Schenkelhalser," *Arch. für. klin. Chirurg.*

The importance of recognising and checking rachitic deformity of the neck of the femur at its very commencement leads me to refer briefly to two instances of the condition that have recently come under my notice at the City Orthopædic Hospital.

The first case was that of a little girl aged $1\frac{1}{2}$ years, who had distinct rickety enlargements of the long bones, ribs, etc.

On rotating inwards the lower limbs, the movement was arrested as soon as the feet pointed straight forward. When the patient was laid on a couch she assumed an attitude characteristic of infantile coxa vara: the lower limbs were sharply bent upon the trunk, the soles of the feet resting against the lower part of the patient's face.

In this case the trochanters were only a shade above Nélaton's line, showing that the neck of the femur had yielded anteriorly to a greater extent than inferiorly. This fact shows that for infantile cases Hofmeister's classification into (1) cases in which there is only upward displacement of the trochanters, and (2) cases in which there is in addition external rotation of the lower limbs, must be supplemented by a third group in which there may be only external rotation of the limbs without marked upward displacement of the trochanters.

The last feature to which I would ask attention in my first case was the absence of any elongation of the limb when downward traction was applied. This feature served to distinguish the case from congenital dislocation of the hip.

My second case was also that of a little girl under 2 years of age; and as in all essentials the second resembled the first case, I need not give it in detail.

Mr. Muirhead Little has kindly brought to my notice a recent article by Kirmisson,¹ who describes a similar case, in which he regards the deformity as the result of intra-uterine rickets. As regards the treatment of such cases, that usually adopted is to wait until the child is six years old or more, and then to perform a sub-trochanteric osteotomy of the femur, fixing the fragment with the foot pointing forwards. It appears to me that in infants, and in young children in whom rickets is still active, a better result might be obtained by applying a light apparatus so contrived that by springs and elastic cords some inversion and downward traction would be kept up on both thighs.

Replying to some remarks by Mr. Keetley,

¹ *Revue d'Orthopædic*, July, 1897.

Mr. JACKSON CLARKE said his interpretation of coxa vara was a clinical one. Some cases of congenital dislocation of the hip closely resembled it, but in them, by pulling down the femur, they could get elongation of the limb, which was not producible in coxa vara cases. In the two cases referred to there was no knock-knee, but the existence of another rickety deformity did not exclude the presence of coxa vara.

A vote of thanks to the Committee of the National Orthopædic Hospital for allowing the use of the room closed the proceedings.

Third Annual General Meeting.

Held at the CITY ORTHOPÆDIC HOSPITAL, HATTON GARDEN,
LONDON, December 15th, 1897.

Mr. NOBLE SMITH was voted to the Chair. The minutes of the last Annual Meeting were read and confirmed.

The Hon. Secretaries' Report was read and adopted.

The Treasurer's Report was submitted by Mr. KEETLEY. It was received and ordered to be entered on the minutes.

The meeting then proceeded to elect Officers and Council for the ensuing year.

Mr. NOBLE SMITH announced that Mr. Tubby, whose term of office came to an end with that meeting, had expressed a wish that he should not be re-elected. They had to accept Mr. Tubby's statement with respect to the matter, but he thought they ought to pass a vote of thanks to him for all the exertions he had put forth in carrying out the duties of his position.

Mr. KEETLEY concurred. He thought they ought to put very distinctly on the minutes their sense of gratitude to Mr. Tubby for his valuable work in the formation and organisation of the Society.

Mr. NOBLE SMITH moved and Mr. E. LUKE FREER seconded the motion, "That upon the cessation of his term of office as Secretary of this Society, the hearty thanks of the members be accorded to Mr. Tubby for the great energy he has devoted to the formation and the interests of the Society, for

his sacrifice of time, and for the courteous manner in which he has fulfilled his honorary duties."

The motion was carried by acclamation.

Mr. TUBBY expressed his great appreciation of the very kind way in which the Society had thanked him. He regretted very much having to relinquish the duties of the Secretaryship, but it was very difficult to do everything and to do it properly. He took the opportunity of apologising for the lateness of the *Transactions*. He saved his credit, however, he hoped, by presenting an advance copy, which he laid on the table.

Mr. Muirhead Little was unanimously elected to the post of Town Honorary Secretary.

Mr. Keetley was unanimously re-elected Honorary Treasurer, and a vote of thanks was accorded to him for his past services.

The following members of the Council retired by lot:—Messrs. R. Jones, Rawdon, S. Sunderland, and Holland.

The following members were elected to the Council:—Messrs. Tubby, Thelwall Thomas, Vincent Jackson, and D'Arcy Power.

It was resolved that the letters "C." "S." and "T." be placed before the names of members who have served in the capacities of Member of Council, Secretary, and Treasurer respectively.

THE HONORARY SECRETARIES' REPORT.

Your Honorary Secretaries are pleased to report that the work of the Society during the past year has been of a most satisfactory character. The number of ordinary members is now thirty-six, and there are six Honorary Corresponding Members, and no resignations. They wish to draw attention to one of the rules of the American Orthopædic Association, which requires Corresponding Members to contribute to the *Transactions* some material at least once in three years, by invitation of the Council, and they would ask this Society to consider the advisability of adding such a proviso to the Rules.

Four Ordinary Meetings have been held during the year, three in London and one in Liverpool. Some excellent discussions have taken place, numerous interesting cases, skiagrams, etc., have been shown, and valuable work in Ortho-

pædic Surgery has been done. The attendances have not been large, but a marked feature has been the regularity of attendance of a number of active members, and in the cases of those coming from the country these attendances have been at the cost of much time and of no inconsiderable personal inconvenience.

The Provincial Meeting at Liverpool was rendered most enjoyable by the hospitality of our members resident there, and the exhibition of numerous cases, and by an excellent lantern demonstration by Mr. Robert Jones, on "Calôt's method of reducing the deformity in Pott's disease."

Your Honorary Secretaries regret the delay in issuing the *Transactions* for 1896, but they are now all ready, and in the binder's hands, an advanced copy being submitted for your inspection to-night. Copies of each year's *Transactions* are forwarded to the leading Societies' Libraries and Scientific Institutions in Europe and America, and their receipt has been gratefully acknowledged.

At the end of 1896 the collective investigation of cases and subjects on which it was desirable to formulate a definite opinion was discussed. The vexed question of the treatment of congenital displacement of the hip was thought to be a suitable one for the Society to investigate, but since the date mentioned nothing further has been done, and now your Hon. Secretaries venture to suggest to the Society the formation of a Clinical Committee of three or four members to discuss the procedure of such an investigation.

The best thanks of the Society are due to those gentlemen who have so kindly exhibited cases and have shown themselves so willing to advance the objects of the Society.

By the lapse of time the town Honorary Secretary's term of office—three years—has terminated, and it will be for the Society to elect his successor.

Twelfth Ordinary General Meeting.

Held at the CITY ORTHOPÆDIC HOSPITAL, HATTON GARDEN,
LONDON, on Wednesday, December 15th, 1897.

Mr. NOBLE SMITH was voted to the Chair.

The minutes of the last meeting were read and confirmed.

ON FIBROUS ANKYLOSIS AND ITS TREATMENT.

BY MR. C. B. KEETLEY.

Mr. KEETLEY said that for years they had accepted certain views with reference to ankylosis in general: namely, that ankylosis was (1) osseous, (2) fibrous, or (3) false—that is to say, that a joint had (1) its opposite surfaces united by bone, or (2) united by fibrous tissue, or (3) that there was something altogether outside the joint, stiffening it, consisting chiefly of fibrous bands passing from one part of the limb to the other, the last condition being called false ankylosis, the view being that the joint was not strictly ankylosed at all. A great many of these cases used, in the part of the country from which he came, and, he was afraid, in other parts, to fall into the hands of the bone-setter, who treated them with very great force and subjected the patient to a considerable amount of pain—a certain small proportion of such patients being very much the better for the procedure. Sir James Paget read a paper in which he stated that they had learned something from the bone-setter; and there was no doubt about it that, either as a result of what the bone-setter did or what Sir James Paget wrote, almost everyone in the surgical world began to use more freedom in the treatment of stiff joints in a violent fashion, and everybody therefore became familiar with the sound of structures tearing and giving way right and left. From what they had been taught and accepted, they used to believe that it was fibrous adhesions inside the joints that gave way; in fact they believed that these were cases of fibrous ankylosis, not of false ankylosis. He was referring chiefly to cases of injury, but a considerable proportion of cases of disease used to be operated on both by the bone-setters, and by the surgeons who had been stimulated in the fashion he had described. The cases of disease to which he was referring were supposed to be cases of accidental origin, but they were not. The result of these views was that the cases of disease which were manipulated in this way used sometimes to take an extremely disastrous course, and he supposed they had all some years ago seen very serious effects follow such modes of operating.

The only scientific indication they had by which to distinguish in what cases of ankylosis or stiffening they were justified in following this treatment, and in what cases they were not so justified, also came from Sir James Paget, who said that when a joint was cold they could pretty safely follow such a method of treatment, but when the joint felt warm it was a

dangerous procedure. There was a good deal of truth in that, and it served a practical purpose: it especially served the purpose of protecting joints which were in a state of acute or subacute inflammation from being tampered with. But the introduction of antiseptic surgery entirely revolutionised the position of affairs as regards these joints, and that revolution was being confirmed, and was destined to be confirmed still more by the discovery of the Röntgen ray process. He should be obliged to be somewhat egotistical to the extent of talking of individual cases which had been under his own care; but it might be more interesting if he did so, and would give his friends better opportunities of criticising him in a lively and pleasant manner.

Ten or twelve years ago Mr. Baker sent him a young woman with an apparently ankylosed knee-joint, the apparent ankylosis being at nearly a right angle. Before coming into the hands of Mr. Baker she had had a great deal of hospital treatment. She had then been taken into the Royal Orthopædic Hospital, where Mr. Baker straightened the joint in the manner then usual—that is to say, with an instrument controlled by keys. To Mr. Baker's astonishment, he found that when the instrument was left off, the leg, as the patient lay in bed, cocked up in an inexplicable way, and became as much contracted as ever. That was a case, he (Mr. Keetley) ventured to say, that was typical of what nine surgeons out of ten in those days regarded as fibrous ankylosis. There was no mistake about the giving way of the structures when the knee was wrenched, or about the previous absolute stiffness amounting to two years. She had spent no less than eight months in St. Thomas's Hospital. Before doing anything to the knee, he thought he would open the joint and see its condition. There were no adhesions whatever inside the joint. The only thing to be found was that the external parts of the joint were extremely short. The joint was altogether small. Instead of having lateral ligaments and capsular ligament of considerable size such as could unfold first one side and then the other, there was practically nothing of the kind at all to permit any movement. He therefore put her under an anæsthetic and forced the joint to bend and worked it repeatedly. He got her by this means a really useful and very movable joint. For years afterwards he heard of her as getting on extremely well. At the time of operation he discovered why her leg had cocked up in so peculiar a fashion, the fact being that she had a dislocated hip. How it had come about he did not know, but that did not bear on the question in hand. The case illustrated his state-

ment that the introduction of antiseptic surgery and the proper use of it enabled them to make an autopsy *in vivo* on these joints, and see what was going on. It had taught them distinctly that true fibrous ankylosis, as a definite thing in such a joint as the knee, was a rarity. When they had a really genuine fibrous ankylosis it was usually the knee joint in a transitional state on its way to osseous ankylosis.

In the printed abstract of his remarks, he had said : "Many cases, formerly regarded as of fibrous ankylosis, are really examples of limitation of movement by some cause external to the joint,—*e.g.* mal-united fracture." With their permission, he would relate a case as an example of this. A medical man, living in Devonshire, fell, some years ago, from one of the high bicycles then in vogue, and greatly injured his right elbow joint. From the time of his recovery from the accident he had extremely limited movement at the elbow joint. When the humerus was firmly fixed as in a vice, movement of the finger ends only took place to the extent of two and a half inches of the circumference of a circle with its axis at the elbow. For years he was satisfied with this condition of affairs ; but having last year sustained another accident to the same arm his hand began to waste, and he found himself losing almost all power in it. Especially were the muscles supplied by the ulnar nerve extremely atrophied. He (Mr. Keetley) made an incision over the elbow joint, and exposed the ulnar nerve. The groove behind the elbow joint in which the ulnar nerve usually lies did not exist as a groove : there was a convexity instead of a concavity. He chiselled out the convexity, and made a concavity of it—having first reflected the periosteum—and then replaced the nerve so that it lay in the new concavity resting on the periosteum, which had been first replaced. At the same time he had opened the elbow joint to find out the real state of things ; yet, although the patient had for years had such extremely limited movement, no adhesion in the elbow joint could be found. The movement had again been limited simply by the way in which the bone had overgrown ; and combined with that, there was extreme shortness of the ligaments and capsule of the joint. He could not at that period, of course, say what had been cause and what effect—whether it was that the overgrowth of bone had prevented the movement, and that the shortening of the ligaments had been secondary, or *vice versâ*, or both had occurred together. But he forced the joint, under an anæsthetic, to flex and extend very considerably, and got a large amount of movement. He cut away the bone wherever

he found that it limited extension, making room, that is to say, for the olecranon to work back upon the humerus. Repeatedly afterwards extension movements were performed under an anæsthetic, and the movements wonderfully improved. Not only was there temporary improvement, but it continued after the operations and treatment of the kind described had ceased. The patient became able, and was still able, to put his hand to his mouth, a thing he had not for many years been able to do, so that he was altogether very pleased with the result.

Continuing to read the abstract, Mr. Keetley mentioned as causes external to the joint, which limited movement, inflammatory deformity, inflammatory adhesions (external), nutritive shortening, combined with contractions of articular capsule and ligaments. When joints were opened years after they were often found free from internal adhesions with their cartilage intact. The bearing of these considerations on treatment he had indicated in relating the two cases. Touching on what to aim at in operating on diseased and injured joints, Mr. Keetley said that it appeared to him that in dealing with a stiff joint, instead of simply just putting the patient under an anæsthetic and guessing that it was this, that or the other cause which operated, if there were any doubt at all, the joint ought to be opened so that its internal condition might be exactly ascertained. In dealing, too, with a freshly injured joint there ought to be borne in mind the extreme likelihood, or at all events the great danger, of some such condition ultimately ensuing as he had referred to, and steps ought to be taken there and then to prevent its occurrence. In illustration of this point he related another case. A boy was admitted to the West London Hospital who had evidently fractured the external condyle of his humerus. On cutting down upon it by means of a longitudinal incision he found that the external condyle, including the capitellum, was turned upside down and inside out, being attached by only a comparatively small piece of the external lateral ligament of the elbow joint and a little bit of the capsule. There was no difficulty whatever in turning it right side up and right side in: it fitted exactly, like a piece of a puzzle, to the humerus, and it was readily fixed by a wire. The boy, whom he had seen quite recently, had now a perfect joint. It was quite obvious that if the thing had not been treated there and then in the manner described he would have run considerable risk of getting what was so common after an accident, namely, a limited power of extension. He could not conceive any method of treating it without operation that would not have been attended by that risk. The rule laid

down by Mr. Jones for elbow injuries he believed was an extremely good one, namely, to flex the elbow well and keep the hand in a supinated position close to the chin till the patient got over the fracture or inflammation resulting from the injury; but obviously that would not have sufficed in such a case as that just described. He did not say everybody ought to undertake the method he had advocated, but certainly the members of the British Orthopædic Society ought to follow that course. Whether members of the Orthopædic Society or not, however, there was no doubt that the introduction of the Röntgen rays had given them a means whereby they might often come to a very easy decision as to what they ought to do both in cases of recent and of old-standing conditions. Mr. Keetley added that there were joints, such as the hip joint, in which there could be a true and permanent fibrous ankylosis; but such were not common. The shoulder joint to a certain extent differed from the hip joint in this respect, because of the mobility of the scapula: if once fibrous ankylosis formed in the shoulder joint it was pretty sure, sooner or later, to become an osseous ankylosis.

Mr. NOBLE SMITH mentioned, as an illustration of the advance which had been made in that kind of surgery, the preparation of the elbow joint of the late Dr. Stewart, from which could be seen what had happened during his life following an injury. He got a stiff joint in the right-angled position. At that time interference with joints was so much dreaded that his colleagues strongly urged him not to have it moved. He himself was very anxious to have something tried, but they all advised that it should be left alone. When, on his death, his joint was examined as he had desired it should be, nothing was found but a slight connection—it had probably once been fibrous but was then osseous—not much more, if he remembered rightly, than one-sixteenth of an inch in diameter, running from the humerus to the radius or ulna, and so keeping up the abnormal position of the limb. The connection was so slight that upon sawing through the humerus the small piece of bone broke and the arm was absolutely free. Such a thing as that could not happen in the present day.

He had jotted down roughly, while Mr. Keetley was speaking, a classification of such cases as they were dealing with, as follows:—

Ankylosis following joint disease.

Ankylosis following strains, dislocations and fractures.

Ankylosis connected with the rheumatic diathesis and especially rheumatoid arthritis.

Ankylosis caused by contraction of tendons and other fibrous structures in the neighbourhood outside the joint.

He drew these distinctions because the various kinds had a different history, and required different treatment. He need hardly remind them how careful they should be in dealing with those contractions following joint disease, to be sure of the absolute cessation of all active disease in the joint itself. With regard to contractions about a joint following injuries, it was for these cases that a great deal had been done recently. Orthopædic surgery had been very effective in dealing with such injuries at the time of their occurrence by preventing the exudation of plastic material in and around the joint. Instead of treating sprains and dislocations by means of evaporating lotions so that they were allowed to swell, they now applied support, especially by the application of adhesive plaster, so that much was done to prevent exudation in the early stages while early movements afterwards were employed. It was now a good many years since he adopted the plan of early movement after dislocations. The first case in which he employed it was that of a lady over middle age. She was very stout, unhealthy, and in many ways a very bad subject; she was, moreover, a pianist by occupation, and had to earn her living by her playing. She injured her right elbow, and, without pulling it about, to examine it very carefully she was put under chloroform, when it was made out that there was a dislocation of the arm backwards. Under the anæsthetic that was very easily reduced. The first day it was allowed to rest, but every day thereafter it was carefully moved through its full compass, being at the same time supported by elastic bandages. Within a few weeks she had perfect movement without stiffness. In that case had the joint been kept absolutely at rest there would, he could not but think, have been more or less stiffness. With regard to fractures, the time would come, he thought, when more movement of the joint would be carried out: and he supported Mr. Keetley in what he had said about operating. There was no doubt a great deal might be done by cutting down on fractures. It seemed to him that in all fractures in the neighbourhood of joints, and perhaps other fractures if there was effusion and the likelihood of the presence of clots, it would become the practice to cut down on the fracture, clear out the clots, put the bones as neatly as possible together and close the wound.

Referring to the question of dislocations, Mr. Noble Smith said he had tried the plan some twenty-five years ago in the case of a favourite thoroughbred mare whose shoulder had been dislocated in the hunting field. The animal was unable to move, and the head of the humerus was obviously lying on the back of the scapula. Having procured some chloroform and put the animal deeply under its influence he got the bone into place. He kept up movement of the joint daily. This had occurred in spring. Next November he hunted her again, and she had a perfect joint. It was well known in veterinary surgery that after that accident a horse was considered absolutely of no use, so that they were generally slaughtered. There had been a few cases where reduction had been successfully accomplished, but even then they were looked upon as perfectly hopeless cases on account of the stiffness.

With respect to rheumatic cases of ankylosis, he was not prepared to say much about their pathology; but where there was a rheumatic tendency—or, rather, where the joints were inclined to suffer from chronic rheumatism—he had always found a difficulty in curing them of contractions. They might divide the contracted tendons and ligaments round the joints, and get them perfectly straight and free for a time; but there was a great tendency to re-contraction. Probably, by adopting Mr. Keetley's method and opening the joints, they might find out more about the condition, and he should be inclined to do that in future.

Turning next to the contraction of tendons and fibres round a joint, Mr. Noble Smith remarked that in modern days they were in the habit of putting patients under ether, or even gas, and suddenly breaking down little adhesions. That result probably followed, to a great extent, the treatment adopted by bone-setters, and when the cases were suitable the results were good. In many such cases he had recently searched diligently for some little point of contraction—such contraction, probably, as the bone-setter was said to support with his thumb before he suddenly broke the resistance down. In many instances he had found a few fibres, some of them certainly off-shoots from tendons, and some, perhaps, inflammatory adhesions; and by subcutaneous section of these little bands the after-treatment had been rendered far more satisfactory. With very little rupture afterwards, or with none at all, the joint had become amenable to extension. It seemed to him a more scientific procedure than that of rupturing the contractions by force. Greater freedom of movement was the result, and there was little or nothing more to be done afterwards.

Mr. MUIRHEAD LITTLE expressed surprise at hearing Mr. Keetley say that fibrous ankylosis scarcely ever existed except as a temporary stage in osseous ankylosis. He had not himself opened many joints; but he had generally acted on the principles stated by Mr. Keetley of trying to straighten them, and, if not, by other means to lay open the joints. One instructive case was that of a boy of 14, who, some years before, had had a blow on his patella which was followed by suppuration and necrosis of that bone extending into the knee joint. When he saw him a good deal of the patella had apparently disappeared. The remains of the patella could not be moved, being fixed to the femur, and the knee was contracted. It could be moved very easily through a certain range; it could be flexed to a little beyond a right angle and extended to within 45 degrees of the straight position. Within these limits the movement was perfectly easy. There was no resistance, and no particular force was required to move it. When it was extended to the degree mentioned, however, it locked quite sharply, so that he thought it was probably due to locking against the remains of the patella, and that an operation by chiselling the patella would free the joint entirely. When, however, he came to operate on the limb he found there was no bony block whatever. He laid the joint freely open, made an incision as for an excision of the joint, and found the whole cavity of the joint, except a small portion about as large as a sixpence, in each half of the joint over the head of the tibia on each side, was occupied by dense fibrous adhesions. The only portion of healthy cartilage was just in the middle. He divided all the adhesions as far back as he dared go, and then tore through the remainder. The boy now had what he believed was still a fibrous ankylosis, but a straight leg. He could scarcely believe these adhesions were on their way to ossification, because the movement was so free, and the bone itself was not exposed. The fibrous adhesions seemed to take their attachment from degenerated cartilage on each side. With Mr. Keetley, he thought the X rays would be very valuable in cases of suspected fracture or ankylosis, and also, in many cases, for diagnosis between bony and fibrous ankylosis. They would settle that at once. A few days ago he had seen a case of injury to the elbow. The boy had fallen on the point of his elbow, and it was generally diagnosed that he had a separation of the epicondyle; but skiagrams being taken of both the sound and the affected limb, it was shown that the whole epiphysis of the humerus was tilted backwards about 45 degrees. Without the aid of the X rays

no one could ever have known in that case what was the condition of things, and it showed the advantage of skiagraphing the sound as well as the injured joint. Without the comparison the nature of the injury was overlooked by all who saw only the skiagram of the affected joint.

Mr. TUBBY thought Mr. Keetley, in his introductory remarks, had laid down one or two points and mentioned two or three facts which might be considered as principles in the matter of ankylosis. He was glad Mr. Keetley had clearly brought out the distinction between extra- and intra-articular ankylosis, especially in cases of injury. In an injury, a large amount of lymph and blood was poured out, and there was considerable matting of the tendons; but if such joints were examined years afterwards, although they had prolonged rest, there was little or no change in the joint—simply absorption of cartilage where pressure had occurred. Mr. Noble Smith had advocated division of such bands as appeared necessary. He thought that, in many cases, it was not so much the fact that the joint had lost a certain amount of movement, but that it was fixed in a vicious position, often of flexion, that troubled the patient so much. It was interesting to know why it was. Why was it that after an injury in which a certain loss of movement was produced there was some loss of extension? Dr. Halsted had performed some experiments, and pointed out that if the knee joint is maintained in full extension, the flexors and extensors can to a very considerable extent balance each other. But they knew that the flexors of a joint were always more powerful than the extensors, and that there was no splint which would keep the knee joint absolutely straight. The point of Dr. Halsted's experiments was that if the flexors were allowed to contract the knee, say two degrees, they gained, not a direct mechanical advantage over the extensors, but advantage to the extent of the square of the number of degrees of flexion, so that as the flexion angle went on increasing, the power of the flexors became progressively greater. Hence, after straightening the knee joint, it often sprang back on account of the advantage gained by the flexors. Mr. Tubby expressed himself as fully in accord with the early treatment after fractures, and indeed went further in saying that in any doubtful case of fracture into a joint he considered it quite the right thing to open the joint. He cited a case by way of example. About three months ago, a lady came to him who had fallen off her bicycle and injured her left elbow. The practitioner who saw her, unfortunately, did not

diagnose the condition or even warn her of the probability of fracture in the elbow joint. After six weeks, the patient, finding that the arm was getting worse and that there was loss of movement, came to him. A skiagram revealed the fact that the external condyle had been chipped off and turned forwards on the shaft. This was confirmed at the operation, at which the callus was taken out, and then passive movements were resorted to, which had resulted in her having a very fair elbow indeed. It would have been a good surgical procedure in that case to open the joint early, and take out the condyle or wire it back in position. The great difficulty in cases of loss of movement due to extra-articular trouble was to get rid of the adhesion and effusion, but that could be done by the pressure of bandages from the first, and by massage, so as to force the effusion back into the lymph and blood-vessels whence it had come. That had to be done early in Colles's fracture; there the usual rule was to exercise them during the first week. Mr. Little had alluded to ankylosis of the knee. He was indebted to Mr. Little for a wrinkle in this connection, namely, that in a case of ankylosis of the knee in a faulty position, if one found that the patella was fixed, one might take it that one had to deal with bony ankylosis, and that violent movements should not be attempted, but that the joint should be forthwith opened. He had made use of that point on various occasions, and found it useful not to attempt to straighten the joint by the ordinary violent movements, but at once proceed to open the joint when the patella was fixed. In the case of a girl of 21 where he found the inner tuberosity of the tibia had atrophied, and the internal condyle of the femur had grown down and occupied the space normally occupied by the internal tuberosity, so that the line of the joint was distinctly "S" shaped, he did not think any amount of violent movement, would have done good. The patella was stuck on to the front of the femur.

He therefore agreed in the desirability of the more free use of the knife and less resort to what were commonly known as violent passive movements which, after all, were nothing else but clumsy and unscientific.

Mr. LUKE FREER referred to those cases—he did not know whether or not they ought to be called real ankyloses or not—where, after fractures of the condyles, a very limited movement was found and the olecranon and coronoid fossæ were filled up with callus and plastic material which to a great extent prevented movement, perhaps generally more in the

way of extension, but also, he found, often in the way of flexion as well. They were generally also found in a state of pronation. One such case at present under treatment occurred to his mind. Mr. Freer further referred to those cases cited by Mr. Noble Smith, complicated by a general rheumatoid condition. In operating on flat foot in a rheumatoid case where valgus ankle also existed, he generally forced the foot back into the inverted position and kept it so on a padded splint for a fortnight or more, adopting thereafter passive and active movements, and the application of Thomas's heels and Holland's arches. In many cases, even after such treatment, a certain amount of fixation was found, and that of a very rigid type. Although under an anæsthetic the foot might be brought round, it immediately returned to the valgus state, as the result of a reflex spasm, especially in the peronei. The treatment described by Mr. Noble Smith of dividing all the contracted bands round the joints he had found most satisfactory, combined, of course, if necessary, with medicinal treatment for the rheumatoid condition. The spastic forms of flat foot which were certainly associated with a certain amount of ankylosis outside the joint were often very difficult to deal with.

Mr. KEETLEY in reply referred to Mr. Freer's remark about fracture of the internal condyle, which, he said, reminded him of what were really the class of fractures which were commonly attended by permanent fibrous ankylosis. They were fractures in which the bones separated, and fractures of the extremity of the internal condyle of the humerus were not unfrequently attended by fibrous ankylosis, because the internal condyle might be pulled down so far that instead of there being an excess of callus there might be no callus at all. This frequently happened in Pott's fracture, with fracture of the inner maleolus, and was one of the reasons for the bad results obtained in connection with it. There was no doubt in his mind that in all such fractures they ought to cut down on and suture the separated fragments unless there was something in the personality of the patient to prevent it. If they had a very wealthy and not very healthy old gentleman to deal with for instance, who had nothing to do but ride about in a carriage, he might get on very well with a fibrous ankylosis of the patella, it would not be right to operate on him. The case of Dr. Stewart, of Middlesex Hospital, was a very interesting case and quite *à propos* of the subject; and he was glad to hear it described. Classification as to cause was of great importance.

Unfortunately, however, they often did not know what the cause was, and they might very easily be misled on that point by the history given. Thus in the case described by Mr. Muirhead Little, where a blow on the patella was followed by suppuration and necrosis, the parents, he had no doubt, imagined it was just a traumatic case. They knew, on the contrary, that it must have been a case of infection of some kind. The rheumatoid cases were those it was difficult to do anything for, but fortunately they were not the commonest cases of ankylosis. They were often those of very old people on whom one would not think of operating. Occasionally also they met with those frightful cases of severe rheumatoid arthritis in almost every joint that there was difficulty in distinguishing from tuberculous cases. A very important question was that of early movement. He confessed—and he did so with some diffidence after what he had heard—that he attached very little importance to early movement. His opinion was that *almost the whole thing to aim at was correct reduction*. He thought they ought to get rid of an old notion with respect to fractures and dislocations. It was that these differed essentially, because a fracture was difficult to reduce, whereas a dislocation was easily reduced and could be kept reduced. Fractures in the neighbourhood of joints were most difficult things to reduce or keep reduced, or, in fact, do anything with in connection with reduction at all; and it was just because they were not reduced that bad results were found. When injury to a joint was severe enough, the patient could not stand unnecessary movements. One of his chief objects in opening that discussion was to call attention to the necessity, as far as treatment with a view to preventing ankylosis was concerned, of restoring the position of the joint and of the parts of the bones correctly. He would take, for example, almost the commonest of all fractures—Colles's fracture. In a Colles's fracture were once properly reduced it really mattered very little if they never troubled to attend at all to its further treatment. If the patient were not a drunken person who would get it refractured, he might not be seen again, and in nine cases out of ten would do as well as if he had been attended every day for two months. The cases cited by Mr. Noble Smith of the lady with the dislocated elbow and of the horse with the dislocated shoulder seemed to him (Mr. Keetley) to confirm the views he had expressed, because they were dislocations; and when they were reduced the bones and the parts of the bones were in their proper

positions, therefore they did well. He thought it well that the horse was exercised: that no doubt tended to the excellence of the cure. Still the essential thing was that the primary reduction was complete. As illustrating what might take place when passive movement was utterly neglected, he cited the case of an officer in the Seaforth Highlanders who had his patella sutured in India. Remaining there for two or three months and then having a long journey home, it was for six months absolutely stiff. Mr. Keetley saw him when he got back, and found his knee joint had the superficial appearance of a perfectly ankylosed joint. After repeatedly putting him under gas, and occasionally under ether, and working it about during several months, he procured him a practically perfect knee joint. Indeed, this officer took a prominent part in one of the most difficult and brilliant assaults recorded in British Indian military history.

That afternoon he had seen a lady who about six weeks or two months ago had a Pott's fracture. It was a compound fracture, which suppurated and was attacked with something very much like erysipelas, the patient having a temperature of $102-103^{\circ}$ for four or five days. He made a very free incision on each side of the joint, and, although it had the appearance of being in a very good position, he found it an extremely bad one: the extremity of the maleolus was far separated from the tibia, the foot was dislocated backward on the tibia, the tibia was much forward, and the fibula was wrenched right away from the tibia, so that a thumb could be admitted at the lower end between them. Besides attending to the inflammatory and infected state, he put in a suture which fixed the inner maleolus to the tibia. That had been of great assistance. No difficulty had since been found in keeping the foot in good position, which was of great assistance in the after management and dressing of the case, and the patient seemed to have promise of having a very good foot.¹ As for rheumatic cases, they might easily be mistaken in thinking cases rheumatic that were not so. Last week he had seen a case in which something like five years ago there was a question whether the lady had rheumatism of the right knee joint or tuberculous disease of the joint, or whether there was a certain element of sham in it. He opened her joint to see, and, finding simply nothing, the treatment by plaster of Paris, etc., was entirely given up, she was encouraged to use her joint, and had remained perfectly well until last spring, when she had some kind of

¹ This promise was fulfilled.

relapse. Mr. Little's case was an interesting one. He (Mr. Keetley), however, had never said that there was not such a thing as true and permanent fibrous ankylosis. He had seen what was probably true fibrous ankylosis of the knee joint. One such was, curiously enough, that of a brother of the military officer he had spoken of. He was a medical man, and his case resembled that of Mr. Little in the fact that his knee had been diseased when he was quite young. There was no doubt that the younger the patient was the more chance was there of his having fibrous ankylosis as the result of a diseased knee joint. It had also to be remembered that in Mr. Little's case the disease was probably osteomyelitis in the patella; the patient probably never had a tuberculous knee joint. Therefore, the knee was probably never, strictly speaking, disorganised; it was simply damaged by pus and by the micro-organisms getting into it. Dealing next with Mr. Tubby's reference to Dr. Halsted's experiments, Mr. Keetley said there was another thing that tended to give the flexors permanent power in cases of disease of the knee joint in youth—namely, that the junction of the shaft and upper epiphysis of the tibia always seemed to be disposed to give way, and often did give way, to the pull of the flexor tendons; so that it was extremely common to find that when the disease had existed a year or two, even although the leg was kept in a splint, a form of back-knee was produced. One of the commonest causes of back-knee, or convexity of the upper extremity of the tibia, was disease of the knee joint. Once that occurred the position of matters was very awkward, and no application of splints could prevent its increasing, especially as care had to be taken in connection with any procedure on account of the disease of the knee joint. The same applied also to osteomyelitis of the lower end of the femur. Mr. Keetley expressed his concurrence with the remarks of Mr. Noble Smith relating to section of tendons or fascia. On the subject of bone-setters he entertained strong feelings, having lived in a district simply cursed with them. He entirely denied that the profession had learnt anything from them of the slightest value. Some of the profession, he was afraid, had learned a good deal of quackery from them. The bone-setters had left them exactly as they found them. Until the last few years they had been, in many cases, unable to form a sufficiently correct diagnosis, as in the case of Dr. Stewart. Of course after his death they knew that certain things might have been done to advantage in that case, but before his death the surgeons did not know. He had seen cases just as innocent which had, nevertheless,

been followed by most serious results when treated in the bone-setters' way. To-day, thanks to antiseptic surgery, they were in an entirely different position, and they would now open such a joint. The progress was due to what had been taught them by Lister, not to what they had learned from bone-setters.

A vote of thanks to the Committee of the City Orthopædic Hospital for the use of the Board-room terminated the meeting.

Special General Meeting

(Under Rule 16),

Held at the ROYAL ORTHOPÆDIC HOSPITAL, LONDON,
Friday, February 25th, 1898,

On the requisition of six members of the Society, for the purpose of making the following addition to Rule 2:—

“And that the honorary members be elected from time to time from surgeons resident in the British Empire, and corresponding members from among surgeons practising abroad.”

On the proposal of Mr. TUBBY, seconded by Mr. OPENSHAW, this was carried unanimously.

Thirteenth Ordinary General Meeting,

Held at the ROYAL ORTHOPÆDIC HOSPITAL, LONDON,
on February 25th, 1898.

Nine members and visitors were present, and Mr. H. A. REEVES was voted to the Chair.

The minutes of the last ordinary meeting were read and confirmed.

The following gentlemen were elected members of the Collective Investigation Committee on the Treatment of Congenital Displacement of the Hip:—Messrs. Jones, Openshaw, Tubby, Reeves, and the Honorary Secretaries.

Mr. TUBBY showed a case of coxa vara in a girl, aged 8, who came under his care at the Westminster Hospital with somewhat severe rachitic deformity. She had genu valgum on the

right side and genu varum on the left, also considerable difficulty in abducting one leg; while the position of the trochanters with reference to Nelaton's line made him suspect that she was suffering from coxa vara. He, therefore, had a skiagram taken, which showed that the position of the head of the left femur was considerably below that of the right, and that there was a certain amount of retroversion of the left caput femoris, so that the head of the femur looked backwards and the trochanter was brought forwards. He was, at first, at a loss to know what to do with such a complex deformity. By an osteotomy of the left femur and left tibia he had succeeded in considerably straightening the left leg; and the question now was what should best be done in order to get the limbs of equal length (the right being the shorter), and to remedy the obliquity of the pelvis. He was divided in opinion as to making an oblique cut through the trochanter above the position where a Gant's operation is done or an oblique incision through the middle of the femur, and so straighten the limb. He should like to have the opinion of the members present on the point. With reference to the coxa vara, he did not think very much could be done. The only possible thing would be to lengthen the limb, the chief trouble being the obliquity of the pelvis. The left leg was $21\frac{1}{8}$ inches in length, the right $20\frac{1}{4}$; but the greater bowing of the right limb prevented reliable comparison between the two.

In answer to Mr. Reeves, Mr. TUBBY said there was a little curvature of the spine.

Mr. FREER asked if the obliquity towards the one side was due to the extreme incurvation on the opposite side, in which case either an operation on the femur or the application of Thomas's knee splint—one on each leg—might be advised.

Mr. THOMAS said he should, in order to correct the deformity, do a supra-condyloid osteotomy, and endeavour to get the right leg somewhat into the position of genu valgum, and thus match the left. He would avoid doing it in the centre of the shaft, having seen osteotomies in that position either not unite well or afterwards relapse as badly as before.

Mr. FREER further remarked that in many of these cases where the rachitic condition was still going on it was wonderful what results might be obtained from the application of a Thomas's knee splint either without operation or after one, the leg being strapped to one or other bar according to the deformity present. After operation the splints were very

useful in keeping the limb, during the rachitic condition, in the straight position.

Mr. OPENSHAW thought the shortening on the right side, and the consequent dropping of the pelvis, was due mainly to the bowing of the leg, the tibia being especially bowed at the upper epiphyseal line and through the tibio-fibular articulation. He should divide the tibia high up, just below the epiphyseal line, and straighten it. By this means there would be an increase in the length of the leg, and the pelvis would become horizontal.

Mr. REEVES observed that an osteotomy just below the ligamentum patellæ would straighten and undoubtedly lengthen the leg; but experience in these rachitic cases taught him that whatever mechanical means they might use for this end, the joint in rickety cases of genu excurvatum or valgum would wobble, being lax, and on the patient's beginning to walk there would be more or less return of the deformity.

Mr. THOMAS mentioned an adult case which had been under his care—that of a woman, aged 30, with the same deformity as in the case shown, apparently in the tibia. He had always found that, even in such a case, it was better to do the supra-condyloid osteotomy; a better result was obtained in the long run. As Mr. Reeves had said, there was apt to be wobbling when the patient began to walk, the reason being, he thought, that the cartilaginous surfaces of the joint had become accustomed to a certain position, and it was very difficult to correct that; in fact, even when the limb was apparently got into a straight position the deformity returned when much weight was put upon it. But if the legs were tied together, with a pad between the ankles, every night, that gradually disappeared. The after-treatment of osteotomy for deformity of the knee was, he considered, almost as important as in talipes itself.

Mr. LUKE FREER recalled the case, mentioned in the first volume of the Society's *Transactions*, of double genu valgum which had been treated by instruments for four years without benefit, and in which he had performed a double Macewen operation with the most perfect results. Eight years afterwards she appeared with most pronounced genu varum on both sides. It was evidently, he said, a case of rachitis adolscientium. She was now 16 years of age, and was still going about with a pair of Thomas's knee splints with straps acting upon the curved legs, and with very great improvement.

Mr. OPENSHAW asked whether Mr. Freer thought that in a girl of that age the curved legs would straighten up.

Mr. FREER remarked that the girl was 6 years of age when she came to the hospital, and said that the improvement as the result of the treatment he had adopted was considerable.

Mr. OPENSHAW: I take it, it is not straight yet?

Mr. FREER: No; it went just to the opposite condition.

Mr. HENRY BAKER had seen many cases of the sort under discussion which had been very much improved by instruments. He had been accustomed to treat such patients in the outpatient department by two splints—one inside splint and a long outside splint, the inside splint acting on the tibia,—and there was no question of the great improvement that followed.

Mr. TUBBY, in reply, thanked the members for the interest they had shown in the case. There still seemed to him the insuperable difficulty that the right trochanter was half an inch below Nelaton's line. He admitted that it was difficult to determine how far by rectifying the curve in the right leg the length would be affected. He thought they ought first to rectify the limb, and wait and see how far that rectifies the obliquity of the pelvis. He would prefer to do the osteotomy through the lower part of the femur, as it was easier, and those through the upper end of the tibia did not turn out so well.

Mr. TUBBY showed another case of coxa vara, from the Evelina Hospital. The girl (aged 9) complained of no pain, but the mother, since the child was two years old, had observed that the left leg seemed longer than the right. The child suffered from marked rickets. He found shortening of the right leg to the extent of three-quarters of an inch, the right trochanter being by so much above Nelaton's line, the left just on that line. There was free movement in every direction except that of abduction, which was limited by the adductor tendons, these being very tense. There was no tenderness and no swelling. The head of the femur was firmly placed in the acetabulum, and had no telescopic movement. The pelvis was tilted and the spine curved so as to adapt itself to the short leg. He watched the case for nearly a year, and then found the shortening of the right limb had increased to an inch and a quarter. He treated her by a cork sole. He had decided to operate by taking a wedge-shaped piece out of the outer side of the thigh, and by a suitable splint

to produce some artificial abduction in the greater part of the femur.

Mr. REEVES remarked that there was some anterior tilting.

Mr. TUBBY: The case had some resemblance to a case of congenital displacement at first sight.

Mr. REEVES said such cases were occasionally seen in the hospitals for women in the later stages, and there was always deformity of the pelvis with narrowed outlet.

Mr. OPENSHAW thought that a wedge taken from the outer side of the femur would increase that depression of the pelvis. He thought it would be possible to crack the femur and tilt it out, without removing a wedge from its outer border, and so avoid further depression of the pelvis on that side.

Mr. TUBBY replied that the object of the removal of the wedge was to overcome the extensive adduction.

Mr. OPENSHAW believed that it would be possible to crack the femur and abduct it.

Mr. TUBBY said it was with hesitation that he brought forward a leg which had been amputated for talipes equinovarus; but they ought to see these things at times. The specimen was part of the limb of a clerk, aged 43, who had suffered all his life from congenital talipes equinovarus. He had been sent from Wales to know if something could be done for him *in a short time*. He wanted a useful limb to walk on, but did not wish to have to undergo any prolonged treatment. Mr. Tubby put before him the usual orthopædic treatment, and stated it would probably take two years. That, however, the patient said he could not undergo, as it would mean the loss of his situation. To the other alternative, removal of the limb, Mr. Tubby told him he was loath to resort, but thought the patient in that case might be able to walk comfortably with an artificial leg. The patient when seen was walking on the dorsum of the foot, in which position there were inflammation and suppuration. There was one large suppurating mass, and pus was exuding from four or five openings. The whole thing was tender and inflamed, and some affection of the tarsal joint seemed to exist. The patient preferring to have an amputation, the question of which operation to perform had to be considered. Naturally, a Syme was first thought of; but in that case it would have been difficult to get a proper flap, the heel being a long way above the ankle joint, and besides, as it had never entirely

been walked on, there was a doubt as to its bearing pressure. Against an operation in the lower part of the tibia, there was the great amount of lateral movement of the knee. The crest of the tibia was also extremely sharp, and the skin over it very thin, so that with the greater part of the tibia in the bucket of the stump he would always have trouble from sores. If amputation were done six inches below the knee, the lateral movement of that joint would not matter since the support would be obtained mainly from the thigh. To this the patient consented, and the specimen before them was the result. It would be again shown to the Society after dissection.

Mr. HENRY BAKER had seen a very severe case treated successfully by tenotomy, which, however, was not congenital, but the result of paralysis—a circumstance on which much depended.

Mr. THOMAS never yet had occasion to amputate the foot for congenital talipes; but he used to hold the opinion that if he had a child with double talipes of a bad character he should do a Syme as soon after its birth as possible. He related a case of double talipes equino-varus which was so bad that one foot was amputated in a neighbouring hospital by a Syme, while the other was to be removed later on. The patient coming under his care, he preformed a tarsectomy, with a much better result than in the case of the other limb, as the patient believed, and as the greater firmness with which she walked on it showed. The loss of a leg was a very serious matter, and he was inclined to think that in Mr. Tubby's case he would have tried removal of a good deal of the foot before amputating. Any stump they could at all get from the foot was, he thought, a better means of progression than any artificial limb that could be procured. He thought that if a good sound stump were obtained, either by a Syme or by the removal of a large number of the bones of the foot, the wobbling of the knee would cease.

Mr. REEVES took it that the man's time was so short that a tarsectomy even was not admissible in the circumstances.

Mr. HENRY BAKER remarked that congenital cases as a rule showed more varus than the present case, which looked like a severe paralytic case.

Mr. TUBBY was certain it was not a case of that kind. He agreed that it was undesirable to amputate for the condition, if

possible; but as the man wanted something done that would not occupy much time, it seemed here the right thing.

Mr. LUKE FREER showed a skiagram of a case of congenital dislocation of the hip. There was no coxa vara. The neck of the femur on each side was particularly oblique. The case had been treated for some years as one of infantile paralysis, but he could obtain no history of any convulsion. The head of the femur was certainly, he thought, an inch or more above the acetabulum. The patient was brought to him as a case of scoliosis. She was a girl about 9 years of age.

Mr. MUIRHEAD LITTLE showed a patient, a boy suffering from paralytic talipes calcaneo valgus in whom he had performed Nicoladoni's operation of transplanting the tendons of the peronei (longus and brevis) into the lower end of the tendo Achillis. The wound healed rapidly and the boy now had considerable power of extension, and the shape of the foot was much improved. Before operation the long axis of the os calcis was almost vertical. While in hospital the contracted sole was stretched by means of a Scarpa's shoe. The foot was put up in gypsum for three weeks, and afterwards faradism and massage and exercises were prescribed. As to the details of the operation, he had divided the tendo Achillis and split the lower end into an anterior and posterior flap, between which the tendons of the peronei were stitched, having previously been bared thoroughly with the knife. The tendons were thus united, with the foot as fully extended as possible.

Mr. REEVES had operated on some cases of talipes calcaneus in the old-fashioned way of obliquely dividing and shortening the tendo Achillis by splicing it up; but most of these paralytic tendons, especially the tendo Achillis, were mere ribbons and tore through when stitching was attempted.

Mr. OPENSHAW congratulated Mr. Little on the result of the case. Fourteen years ago he had himself assisted Mr. Reeves at one of the operations he had mentioned, and it had led him always to undertake the operation with considerable diffidence. The case before them inspired new hope, and he would adopt the procedure described in future. Seeing the peronei were healed and constant use of a muscle was a perfect stimulus, there was no reason why they should not become as big and strong as the original gastrocnemius and soleus.

Mr. MUIRHEAD LITTLE, in reply, said that the peronei were doing harm by pulling the foot out, and by putting them on to the other end of the lever they tended to pull it in.

Putting them behind the ankle joint instead of in front, the tendency was to pull the toes inwards and correct the valgus.

Mr. LUKE FREER said that he supposed the special object was to get the new nerve supply.

Mr. MUIRHEAD LITTLE said that was so. He rather regretted not having treated the sole first and divided the plantar fascia.

Mr. THOMAS showed skiagrams of congenital deformity of the forearm and hand in a child, a year and seven months old. There was total absence of the radius and thumb, the fingers were fairly perfect. In consequence of the absence of the radius the fingers were turned inwards almost at a right angle. There was a large callosity at the angle such as was seen in cases of club-foot. He did not think much was to be done, he had thought he might get the hand straight with the forearm by taking a piece out of the ulna; but after careful consideration he thought it best to let it alone unless he could arrange some kind of artificial thumb to which the child could oppose the fingers. He had never heard of such an instrument, but would be happy to hear any suggestion in that direction. The carpus was tolerably perfect, but at that age being almost entirely cartilaginous did not show in a skiagram. The condition was interesting rather as a curiosity than from any benefit treatment might afford. Most of these cases learned to make use of their hands better by themselves than anything that could be done for them, and on the whole he was generally opposed to operative interference in these cases.

Mr. TUBBY spoke of a child under his care with congenital club-hand of the radio-palmar variety, in which at the time he saw it, four years ago, he thought there was no radius, though he could not be sure about its upper extremity. He applied a malleable iron splint to the inner border of the forearm, curved at first and then gradually straightened. He had seen the case from time to time for three or four years, and believed there was some evidence of bone formation where the radius had appeared to be absent formerly. From the upper extremity of the radius to about half-way down distinct bone could be traced. The lower end of the ulna was much enlarged, and seemed to occupy the space normally occupied by the radius and ulna. There was a thumb, but no first metacarpal bone, while the inner side of the thumb was joined to the hand by skin.

Mr. CROUCH had seen a girl, 18 years of age, who had congenital absence of the radius and no thumb, but who had a perfectly useful hand, and earned her living as an expert needlewoman.

Mr. MUIRHEAD LITTLE referred to a case, skiagrams of which he had shown to the Society one taken when the child was only a few weeks old, the other at about the age of 12 months. Despite the use of a splint, the ulna had during that time got markedly curved. He intended, with the parents' consent, to do a Bardenheuer's operation, splitting the lower end of the ulna and putting the upper bones of the carpus between the split. The lower end of the ulna was unusually large. There was no sign of a thumb or metacarpal of a thumb.

Mr. TUBBY thought the ulna was always hypertrophied in these cases. MacCurdy had done several operations according to Bardenheuer's method, and spoke of them as having done well.

Mr. LUKE FREER had a similar case to that of Mr. Thomas brought to him a month ago, that of a child six weeks old. The thumb was certainly not absent, nor did he think the radius entirely wanting although it was very much shortened. His view was to take a piece out of the ulna just above the lower end, and dividing some of the ligaments and tendons on the contracted side, to bring them together and so get a fairly useful hand.

Mr. THOMAS, in reply, said he was disinclined to do anything which might make the condition worse. He did not think operative proceedings would help it much: the child was learning to use its hands, and he thought it better to wait. In any case, operative measures would be better postponed until the child was older.

ON SOME POINTS IN CONNECTION WITH FLAT FOOT.

PAPER BY MR. MUIRHEAD LITTLE.

Some confusion has been caused by the habit of describing the so-called arch of the foot as though it were an arch in the architectural sense. This, as somebody has pointed out, it is not. In architecture an arch consists of wedge-shaped blocks which are not necessarily joined by any cement, but as long as

there is enough resistance to the lateral thrust, by means of piers and buttresses, the structure is maintained in position by the interlocking of its component parts. It is intended to bear vertical pressure which is applied over its crown.

This, I take it, is practically the sole function of the simple arch, and the function of the compound arch or vault is little more than this. Such arches are, or should be, completely rigid structures.

The principal arch of the foot, on the other hand, consists of a number of bones which are joined more or less closely to one another by ligaments and muscles, so that were all these removed it would collapse. In this respect it differs essentially from the architectural arch. It is, moreover, supported by other muscles and tendons which occupy the chord of the bow, and have thus been, with some appropriateness, likened to tie-rods, such as are unfortunately conspicuous in some old buildings—in Westminster Abbey, for instance. These tie-rods resist the lateral thrust which tends to separate the heads of the piers of the arch.

In the wrist there is a somewhat analogous arrangement of small bones, whose office it is, while allowing free motion, to break up and absorb the violence of the shock of a blow on the hand.

As, however, the foot is exposed to far more violent shocks than the hand, a modified arrangement is found there, corresponding to the modification of function. Not only are there a number of small bones, but the curved form in which they are arranged acts as a bent spring in absorbing violent jars, a large part of the energy of which is spent in overcoming the elasticity of this spring, and of the tense calf muscles.

The foot also acts as a lever either of the first or third order, its fulcrum being, of course, the ankle joint; and it is as a lever that it is most often employed, and especially as a lever of the first kind where the calf muscles are the power, and the pressure of the toes against the ground the resistance. It is obvious that in this action the muscles and ligaments alone prevent straightening out of the arch and flattening of the foot. For this is a kind of strain which the architectural arch is not fitted to resist successfully.

Mr. T. Horrocks Openshaw has called attention to the transverse or anterior arch formed by the metatarsal bones, and properly insists on its importance in maintaining the foot in efficient condition, as well as the transverse arches, which are really part of the longitudinal arch or semi-vault. (*Clinical*

Journal, vol. v., 1894.) He has shown very clearly in that article the way in which turning out the feet in walking causes extra strain on the inner border of the foot.

Golèbiewski, Meyer and Dane have shown (*Amer. Orth. Assoc.*, vol. x.) how, when the foot is over-pronated (*i.e.* rotated inwards), loading it causes much increased depression of the inner arch and raising of the outer arch of the foot, whereas in the normal, loading causes slight depression of the inner arch and still more depression of the outer as measured at the base of the fifth metatarsal. According to this view the initial change in flat foot then is over-pronation. Yet this over-pronation may exist with talipes arcuatus.

Speaking generally, the cause of flat foot may be said to be a reduction of the resisting power of the foot so as to be unequal to the strain to which it is exposed. An overloading in fact.

Increase of strain, the resistance remaining the same, or diminished resistance, the strain being unaltered, may equally produce the deformity, or, of course, both factors may vary with the same result.

I will here only mention the atonic, rachitic, arthritic and traumatic varieties.

Weakness or overstrain and fatigue of muscles, especially the tibialis posticus, are important factors in the production of acquired flat foot. The greater the giving way of the ankle and arches, the greater the disadvantage under which the muscles act. Perhaps one is apt to forget that in flat foot not only are the arches affected, but the whole foot and the bones forming the ankle and subastragaloid joints are affected. Thus there is rotation inwards with a consequent lowering of the internal malleolus.

It has been shown that in the healthy limb the internal malleolus moves inwards and downwards when the weight of the body is thrown on to it. In flat foot an exaggeration of this movement takes place, until the position becomes constant, and even the outer border of the foot may be raised up from the ground. No doubt this is largely due to inefficient action of the tibial muscles and leg flexors.

From the point of view of treatment, perhaps the most important consideration is the condition of mobility of the foot and its articulations—rigidity, or normal mobility, or even flaccidity.

In atonic flat foot or spurious valgus in children—the kind of cases of which one sees so many among the out-patients—associated with slight rickets, there has been no absolute

excessive strain but a diminished resisting power. In these there is generally no rigidity or muscular contraction; indeed, as long as no weight is placed on the foot and ankle, there is no fault to find with their form in many cases.

In the flat feet of such persons, as shop assistants, errand lads, and carpenters, &c., there is generally considerable rigidity and muscular contraction, and probably some chronic arthritis. Such feet are often clammy and bathed in perspiration. The general nutrition of the parts is impaired.

With the flat feet of rachitic infants we are all familiar.

In genu valgum, theoretically, flat foot should not occur, for in order to place the sole on the ground the foot must be rotated outwards and its inner border raised in relation to the leg; but there is, I believe, no doubt that marked cases of flat foot are seen accompanying marked in-knee, although I know so careful an observer and high an authority as MacEwen denies this.

I have not been able to satisfy myself that flat foot has any special association with scoliosis. That is to say, it does not appear to be commoner among scoliotics than among other young women or lads. The diagnosis of flat foot is easy, but there is a class of cases, to which Mr. F. R. Fisher drew attention in his paper in the *Lancet*, in 1889, in which there is marked rotation inwards at the ankle—valgus ankle—with a normally or abnormally high arch. Drs. Lovett and Dane described this condition in a paper in the *New York Medical Journal*, March 7th, 1896, and called it "Pronated Foot." This title seems hardly appropriate, because it implies that the normal foot is not pronated.

A good many of these cases have come under my notice, and I have a photograph and footprints of one of them here. (See Figs. 1, 2, 3.) Some of these footprints, coupled with the



FIG. 1.



FIG. 2.

valgus state of the ankle joint, might almost suggest talipes calcaneus; but I have not found any undue lengthening of the tendo Achillis in them, nor any paralysis. More often there seems to be a rather limited range of movement at the ankle joint.

Such footprints as these, made by wetting the sole and then pencilling round the impression before it has time to dry, or, better still, by printer's ink, are often used as records or a means of diagnosis.



FIG. 3.

They are not always trustworthy, as in some obviously flattened feet a large part of the arch may be still just clear of the ground, so as not to leave a mark on the paper. The impression obtained may thus be that of a normal arch. How much of the normal foot rests on the ground? This is a question that I think has not been hitherto answered. Some surgeons would say that a given tracing was normal; others would say it was that of a flat or too arched foot. In the fat feet of young children a deceptive appearance of flatness is produced.

Some years ago my friend, Surgeon-Major Cottell, was kind enough to obtain for me impressions from fifty recruits passed as fit for the army. They were, of course, all young men; and as I am told that the condition of the feet receives special attention at recruiting stations, these impressions ought to be fairly representative of the normal foot.

For purposes of comparison, I have measured the arch in these in the following way:—

(A) A base line drawn along the inner side of the impression, touching the two most prominent points of it—the heel and the first metatarso-phalangeal joint; from this another line at right angles to it, extending to the widest part (B) of the arch. A similar line measuring the widest part of the foot, always about the heads of the metatarsal bones (C). (See Fig. 4.)

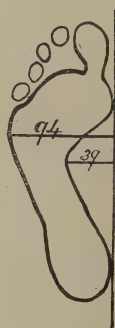


FIG. 4.

By using *B* as numerator and *C* as denominator I get a fraction which, expressed in decimals, gives a figure which can be easily compared with other results. This decimal fraction I call the index number.

An examination of the fifty footprints shows a most surprising variation—some are apparently flat feet and others over-arched.

The average index number is	'420	right
"	"	" '415 left
The flattest	"	" '105 right
"	"	" '061 left
The most arched	"	" '625 right
"	"	" '631 left
In 29 cases the figure was highest in		right
In 20	"	" left
In 1	"	" exactly the same.

In some feet the widest part of the arch is further forward than in others. There is a considerable range of variation in this respect.

The treatment of flat foot is either *palliative* to relieve pain, &c., the treatment having to be continued indefinitely, or *curative*, designed to remedy the deformity and eventually dispense with all treatment.

In practice the same means are often used both as palliative and curative agents. I have been in the habit of ordering gymnastic exercises, such as those recommended by Mr. Ellis, in all cases of flat foot in young persons, when there is no rigidity, or when the rigidity has been overcome by previous treatment. I believe that these exercises are good; but I have not hitherto obtained the very marked results claimed by Mr. Ellis. Possibly this is because my patients have not carried out orders zealously and thoroughly. I do not know, but I was much struck by a remark made by Mr. Jackson Clarke at a recent meeting of this Society. He described a case of one-sided flat foot that he was treating by tiptoe exercises, &c., and he said that the before sound foot became flat during this treatment.

This suggests to me that perhaps the method is not so infallible as it has been represented to be. However this may be, I have in no case contented myself with these exercises alone as a means of cure, and therefore I cannot say how much of the improvement in any case is due to them.

In all cases where the deformity cannot be easily reduced at once, correction must be undertaken. At the National Orthopædic Hospital, as a routine proceeding, all cases are made to spend as much time as possible sitting in the tailor position cross-legged on a bed. If at the end of a week or two of this treatment there is still tightness of the peronei and extensors, I divide the tight tendons. If this is not enough, I have recourse to forcible reduction under ether by means of Thomas's wrench. In all cases the foot is maintained in an

adducted position by means of a Scarpa's shoe or other retentive appliance when the patient is not sitting cross-legged. Gypsum is highly spoken of by many surgeons, but I have not much experience of it.

By these means I have seldom failed to get the foot into a good position, and then some retentive apparatus is needed.

The method of raising the inner edge of the boot sole, and thus throwing the point of incidence of the weight of the body further outwards, is a very old one. It was recommended in a lecture in this hospital, in 1843, by my father, W. J. Little, and was much used by Professor Miller of Edinburgh, and afterwards associated with the name of the late H. Owen Thomas of Liverpool.

This I believe to be an excellent plan in non-rigid cases of medium or slight severity. I have generally applied it by leaving the boots alone, and inserting a wedge sole inside. In this way it is easier to keep the boots in order. Of course, they must be extra large. In children of three years, I have used as much as half-inch on the inner side. These wedges are very easy to make, of leather or poroplastic felt. These I have here I made myself. The felt has this advantage, that it can be made soft by heat, and thus fitted closely to the inside of the boot. By thus raising the inner edge, the foot being rotated outwards, the long muscles on the inner side, and especially the tib. posticus, are enabled to act at greater advantage. In more severe cases, where there is marked rotation at the ankle, a thin curved steel spring concealed in the upper of the boot on its outer side (convex outwards) holds up the ankle, combined with the wedge sole in the boot. Valgus pads of soft materials, such as rubber or leather, are of little use unless supported by a T strap. Boot heels should be fairly high but broad. In severe cases the familiar outside upright and valgus pad and T strap is a very effective support, but has the disadvantage of being costly and heavy. The weight is sometimes prohibitory. Metallic plates, such as the Whitman brace, are simple and, if properly fitted, effective; but some patients cannot bear the pressure of the scaphoid against the unyielding metal. The deformity must of course be reduced before they are fitted. When they are comfortable they are very effective, and keep in good condition for years, and no special boots are needed. All the above appliances may be simply palliative, or if persevered with, they are in most cases curative. Of cutting operations for the cure of flat foot, that of Ogston seems to me to be the best.

Mr. JACKSON CLARKE said his case, to which Mr. Little had referred, was that of a very intelligent boy whom he had taken some pains to coach in the exercises, getting him to perform them in his presence, and not allowing him to turn his toes out, so that he had every reason to think they were carried out faithfully. The boy had been doing this for a week, when he came back with what had been his good foot worse than his original flat one and the flat one no better. He took the boy's most recently developed—that is, the most acute—flat foot and reduced it with his hands. He felt they could not trust to the exercises alone. He gave his hospital cases a good rubber pad with outside iron and T strap, and every average case was curable in that way. Some unpromising cases had also been cured and many much benefited. The thing to look out for was the yielding of the boot in the waist. For that reason he had the heel carried forward obliquely to meet the thick part of the sole. In private practice he should certainly try Mr. Little's concealed spring. It was not a nice thing to put a visible iron on a young lady's foot.

Mr. OPENSHAW thought most of the surgical books were wrong as to the causation of the condition, or rather as to its morbid anatomy, in saying that the inferior calcaneo-scaphoid ligament was stretched and thinned. He did not think that was the fact in the majority of cases. Where it was stretched he believed it was considerably thickened. In the majority of cases, however, he did not think it was either stretched or thickened, but that upon the point of its attachment to the calcaneum the foot rotated outwards upon the back part of that ligament as a centre, the scaphoid bone rotating on the head of the astragalus, which remained in its proper position with regard to the internal maleolus. The front part of the foot rotated outwards around the head of the astragalus, so that ultimately the head of the astragalus bulged through the internal calcaneo-scaphoid ligament, whilst the inferior calcaneo-scaphoid ligament passed to the outer side of the under surface of the head of the astragalus, so that the head of the astragalus was allowed to bulge the inner border of the foot and so ultimately reach the ground. The plates shown by Mr. Little, with high arch and much valgus of the ankle, seemed to him to prove that the arch itself was not destroyed until the astragalus almost touched the ground. The recent anatomical investigations of Dr. Barclay-Smith, of Cambridge, proved clearly that the astragalo-scaphoid joint was a ball-and-socket joint, the scaphoid bone being a socket

for the head of the astragalus, round which the foot could rotate almost as freely as the hip bone did in its socket. For severe cases of flat foot, he considered no operation could approach Professor Ogston's, in which the head of the astragalus and the articular surface of the scaphoid were removed. This he had done in over a dozen cases, with much benefit in all. Two girls wished the operation to be done in the other foot after one had been treated, which he thought as conclusive a test as could be applied to any operation.

Mr. LUKE FREER concurred with Mr. Jackson Clarke's remarks as to foot kinetics being an important curative agent in the majority of cases of flat foot. By themselves exercises were not as a rule curative, except, possibly, in cases of slight valgus ankle. His usual treatment of fairly slight cases of flat foot was forcible *redressement* and putting them up in a boomerang splint for two or three weeks. This had sometimes to be repeated. The Whitman's brace shown by Mr. Little seemed to him rather heavy; he preferred a sole thickened on the inner side obliquely, with Holland's arch inside the boot. Pads of india-rubber or cork left callosities on the inner side: Holland's arch was springy and a better support. In the more severe cases tenotomy was essential. The foot kinetics he generally adopted were tiptoe walking and extension, inversion and flexion, twenty times night and morning, with resistance by the assistant or mother, increased according as the muscles on the inner side developed.

Mr. TUBBY referred to an older method of measurement adopted by Mr. Golding-Bird, in which the normal foot was divided into two equal parts at a point opposite the base of the first metatarsal bone. When the foot became flattened the posterior part became greater than the anterior, the posterior exceeding the normal measurement sometimes by half to three-quarters of an inch. He had always very closely associated genu valgum and flat foot. In ankle cases he thought were due to over-action of the peroneus longus tendon, the outer border of the arch of the foot being turned outwards and raised. Whether it was associated with some obscure nervous lesion he did not know. Of one class of flat foot he had seen several cases lately, cases in which the deformity was not very marked but in which the foot was extremely rigid. When the patient was anæsthetised the deformity could be easily reduced; when they came out the peronei tendons became tense, the deformity returned, and any attempt to reduce it caused pain. Mr. Robert Jones had found that in

such cases it was useless to merely divine the peronei tendons and put the foot in position: he had been accustomed to take out half-an-inch of the peronei tendons. He had himself done that in four cases with the greatest success, the spasm had disappeared, and the foot had come to its normal position where it could be retained by apparatus. Tenectomy rather than tenotomy was of the greatest value in these cases.

Mr. LITTLE replied to the discussion. Some surgeons, he said, held that osteotomy restored the arch without relieving the symptoms in many cases. What Mr. Openshaw said about the projection of the astragalus was just and true, its projection inward being a very marked feature in the falling of the arch. Mr. Golding-Bird's method of measurement was a very excellent one, but was not available for him, seeing he had only footprints, from which he could not gauge the position of the metatarsal joint of the great toe. He had not seen any signs of over-action of the peroneus longus in cases of in-ankle; some of them had been slightly rigid, but as a rule not markedly so. He could not understand how removing half-an-inch or an inch from the peroneus longus removed spasm, because the tendon was already contracted or in a state of chronic contraction. He should like to know the rationale of that treatment.

A WRENCH FOR TALIPES EQUINUS (FIG. 1) AND FOR TALIPES VARUS (FIG. 2).

By MR. HENRY F. BAKER.

The accompanying illustration (Fig. 1) shows a form of wrench for the treatment of obstinate talipes equinus, which I have found to be of considerable service in suitable cases.

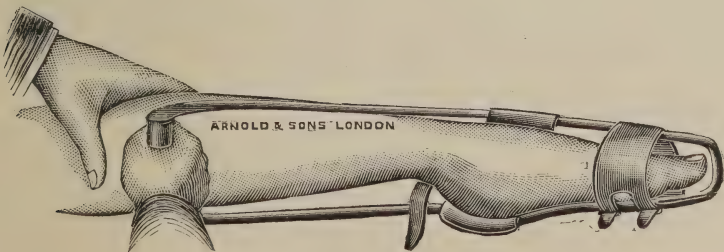


FIG. 1.

The foot having been covered with cotton wool and bandaged the instrument is applied as in the figure. The patient having been placed under the influence of an anæsthetic, lies on the same side as the deformed foot. The knee is then steadied by an assistant, and the surgeon stands behind the patient, and holding the extremity of the foot-piece in his left hand, proceeds to overcome the equinus by drawing the handle of the wrench towards himself with his right.

Fig. 2 is a wrench on the same principle as that already described for the treatment of talipes varus, and is applied to the patient while lying on his back. The foot is bandaged as before, and the knee is to be held firmly by an assistant. The surgeon stands facing the inner aspect of the leg, and pulls the

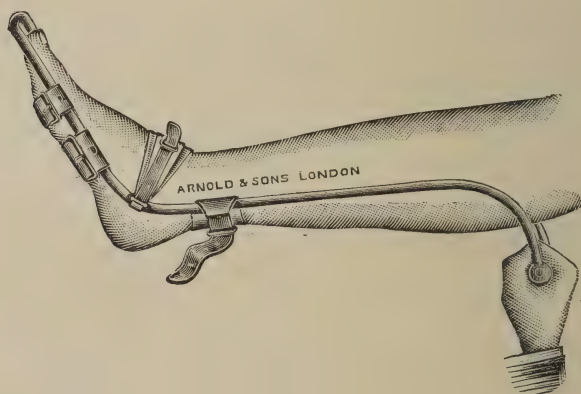


FIG. 2.

handle towards him with his right hand, holding the foot-piece of the instrument with his left. It is necessary that the ankle and other straps should be kept as tight as possible. It will be seen that although a great amount of leverage is brought to bear on the deformed foot, the force used can be regulated with great nicety. These wrenches are made by Messrs. Arnold and Sons, of West Smithfield.

A vote of thanks to the Hospital authorities closed the proceedings.

Fourteenth Ordinary General Meeting,

Held at the ROYAL MINERAL WATER HOSPITAL, BATH,
on Saturday, May 14th, 1898.

In the afternoon, the members were conducted round the baths, and the most interesting Roman baths and remains, by the Secretary-Superintendent, who most courteously explained the many objects of interest.

The wards of the Royal Mineral Water Hospital were also visited.

Seventeen members and visitors were present.

Mr. Keetley was voted to the chair.

The minutes of the previous meeting were read and confirmed.

A SHOE FOR THE TREATMENT OF TALIPES OR OF FLAT FOOT.

BY MR. WILLIAM THOMAS.

MR. THOMAS exhibited and described a simple and cheap shoe. The sole was an ordinary wooden splint the shape and size of the foot, fitted with an india-rubber pad to support the arch, and having an appliance by which india rubber bands could be fixed to the knee. He found patients could wear this at night with great benefit; it was exceedingly cheap, and very easily made, and everyone with mechanical ingenuity could make it. The old method of fixing the rubber bands by strapping had not been carried on with any great amount of satisfaction, but by substituting an ordinary piece of wood at the bottom of the foot it seemed to transfer the power much better.

MR. PAGAN LOWE showed, by invitation, a pair of boots with wedge-shaped soles, thickened on the inner edges, for the treatment of flat foot. He had found them useful in rheumatic cases.

MR. NOBLE SMITH was not in favour of raising one side of the boot. In every case of flat foot there was some special condition. It was not, he thought, desirable to alter the

position of the heel, but only the part which was depressed. This could be effected in most cases by bringing into action the muscles that acted upon the arch. When an apparatus was absolutely required, he had found it necessary to have a side iron bar with a T strap to the boot. He had discontinued the use of sole pads, and was in the habit of treating cases either simply by exercises, or, if support was necessary, by the means he had mentioned; and by having the heel of the boot brought forward on the inner side of the foot,—this left the freedom of the foot in the boot, whereas the pads did not allow of that freedom.

Mr. MUIRHEAD LITTLE said that he had used wedge-shaped soles with very good results. The method was very old; it was recommended years ago by his father, and by Professor Miller of Edinburgh, and afterwards by Mr. H. O. Thomas of Liverpool. The principle of the treatment was that it transferred the incidence of the weight of the body outwards; it certainly relieved pain to a great extent in cases of flat foot. In more severe cases he supposed they all found a steel support and a T strap necessary.

Mr. TUBBY thought a good deal of the success in treatment depended on the recognition of the degree of the affection. In hospital practice, in the severe degrees of flat foot, he had been accustomed to use a boot with a vulcanised rubber pad beneath the instep, and an outside steel support and valgus T strap. If the waist of the boot gave way, he prolonged the heel forwards on the inner side. In private practice, in early cases, patients could be readily cured by having a properly constructed boot made on the principle advocated by H. O. Thomas.

Mr. Tubby ventured to disagree with Mr. Noble Smith's remarks as to the inefficiency of the wedge-shaped sole and heel in the treatment of flat foot. He (Mr. Tubby) pointed out that it was impossible for flattening of the arch of the foot to co-exist with an inverted sole; and the great value of the modified sole and heel consisted in the fact that it produced this inversion. He therefore wished to express his approval of Dr. Pagan Lowe's pattern of boot.

Mr. FREER agreed as to the passive manipulations and foot kinetics, as tiptoe walking, etc. Pads tended, whatever they were made of, to cause horny thickening by their pressure. He preferred Holland's arch.

Dr. MELSOME enquired if anyone had had much experience of Whitman's steel brace. Having worn it himself for con-

siderable periods, he found it more satisfactory than any other appliance in the early stage of flat foot ; unfortunately no one in this country at present had made them with sufficient care to make them comfortable. An intelligent patient could often make a pair for himself which gave far more comfort and satisfaction than a pair made by an instrument maker.

ON RHEUMATOID ARTHRITIS, ESPECIALLY FROM A SURGICAL STANDPOINT.

BY MR. C. T. GRIFFITHS.

In opening such a discussion, Mr. GRIFFITHS said that he felt that Bath was a veritable Klondyke as regards its wealth of experience in rheumatoid arthritis ; but his absence from the city for eight years had rendered him less competent to speak on the subject than he would desire. It was not a paper he was going to read, nor his own views he was going to advance ; but they were suggestions which they might thresh out and discuss with the object of throwing some little light upon rheumatoid arthritis, which they probably agreed with him was shrouded in a certain amount of mystery—a feeling that they had got to a certain point and no further.

As regards the medical aspect, he thought they had during the last five or six years learnt more from researches upon the matter than for the previous twenty years.

As an introduction to the discussion, he was speaking strictly from a medical point of view, and he asked, with all their knowledge of the treatment of rheumatoid arthritis, could they look around and say they had had success in cases in which the disease was in an advanced condition ? For his own part, he could not conscientiously say so. For some years past some of the best observers had laid it down that unless you take rheumatoid arthritis in its early stages you cannot do much good ; but if you are fortunate enough to be in time, the result of your treatment will be much more satisfactory.

Although in some cases the medical treatment may not arrest the progress of the disease, it may materially prevent the system from being weakened still more, and very much ameliorate the condition of the patient. They were all of opinion that prevention was better than cure, and if they could see those cases before the arthritis was the leading feature

he thought much might be done to prevent ultimate joint implication.

With regard to the surgical aspect, upon which he laid emphasis, he had had very little experience; his practice in the medical treatment had been obtained chiefly in Bath and Birmingham. From the medical aspect, he thought they were agreed that a case of rheumatoid arthritis should be treated in a way altogether different from the treatment which would be required for a case of pure rheumatism or pure gout. In rheumatism and gout, patients usually applied for treatment before serious joint complications had occurred; in rheumatoid arthritis, joint trouble and perhaps distortion has probably set in before the patient consults the doctor. Most patients would not apply for treatment until this had occurred.

He proposed that rheumatoid arthritis should be considered to see whether the surgeon could step in and, by operation, not only give better movements to the joints, but render them more comfortable for the future. When he was Resident Medical Officer of that hospital, from 1885 to 1890, he had an opportunity of studying rheumatoid arthritis under various conditions and phases, and he was able to state that a considerable amount of benefit was derived from the medical treatment. But it was no uncommon thing after a few weeks' treatment for the physician to call in the honorary surgeon to consult him with a view to something being done to further aid the progress of the case, obviously from a surgical point of view.

He was speaking then of ten years ago, and during this time on several occasions the surgeon was consulted, with the result that adhesions were broken down under chloroform and forcible movements performed which one would have hesitated to have done in private practice. These cases on the whole did very well; at least, he was never informed of any case going radically wrong, and he was particularly careful after a patient left the hospital to correspond with him as to the result.

With regard to the employment of force, he thought that many of them would fight shy of breaking down adhesions, because if anything went wrong they were blamed, and if everything went right they got very little credit. If there was more active attention given to the joints, conducted of course with due respect to constitutional conditions, they would see less of the contortions and distortions of rheumatoid arthritis.

It was for them to consider whether better results could be attained by performing arthrotomy or forcible passive motion to enable a patient to get relief from, say, a flexed ankylosed

joint by making the same joint ankylosed in the straight position.

One or two cases of flexed knee were thus treated in that hospital during his period of office, but he did not think that bony ankylosis existed, and they turned out very well.

They must remember this—that rheumatoid arthritis was distinctly a disease of debility, and that debility was often occasioned by the tuberculous diathesis and thus was a cause of rheumatoid arthritis. If they had these joints to deal with they would think twice before they decided to conduct any active interference on account of the tuberculous taint, if they could trace that trouble in the joints. If they found the trouble principally a local one, the risk would not be great and they could afford to operate with impunity.

Another point was, whether rheumatoid arthritis was due to primary chronic changes in the joints of a degenerative nature with inflammatory action superadded later. He thought a great deal of the disease was due to primary chronic or even subacute inflammatory process, and that operative treatment was more likely to be successful in such cases than if the inflammatory process was the result of a degenerative process by reason of the cessation of inflammation. If distortion of the joints existed, followed by inflammatory condition, then the advisability of operating would have to be seriously considered, as the surgeon may be tempted to interfere during an inflammatory attack more or less obscure. If the inflammatory condition is the primary condition and they could trace this process to a considerable time back—that is, sufficiently long to reasonably conclude the inflammation had abated,—they could undertake the operative process. Of course the age of the patient would enter largely into their consideration.

Although his own practical experience had been limited to somewhat rude break-downs of adhesions in this hospital, he thought that if more operative interference was carried out with judicious care, more good could be done in that contorted condition of joints, when osteophytes were present and the mushroom-shaped ends of the bones had become obtrusively evident.

He asked them to consider the various points he had suggested in connection with the surgical aspect of rheumatoid arthritis.

Mr. KEETLEY said that they must all feel, in considering this subject, the primary difficulty was due to our not knowing what rheumatoid arthritis is. Not many years ago they were in

the same difficulty with regard to tubercle. Bacteriology had put them in a better position in respect of that disease. But the far-seeing and acute had a shrewd guess at the nature of tubercle long before the bacillus was demonstrated. In former times we heard much of the "strumous diathesis," just as we still hear much of the "rheumatic diathesis." It is now doubtful whether such a thing as the former exists; for, even when numerous members of the same family are tuberculous, we cannot eliminate, as causes, exposure to similar external influences, not to mention the action of chance in a disease so common as tubercle. Some day we might hear the last of the terms "rheumatic" and even "gouty" "diathesis."

Speaking for himself, he could not get further, at present, than regarding chronic arthritis as a group of pathological appearances following various conditions, *e.g.* tubercular infection, gonorrhœal infection, uterine and vaginal catarrh, and also traumatism. The analogy with tubercle was obvious, and, indeed, it was often difficult to diagnose one disease from the other.

Whatever the essence of the disease might be, its pathological changes were partly primary and partly secondary, and that should be borne in mind in settling the question of surgical treatment. The secondary changes included the growth of nodules of bone inside the joint, or on the margin of the joint, or even outside it. These, he thought, were distinctly amenable to surgical treatment, and ought to get it more frequently than they do.

A long time ago he opened the hip joint of a youth, thinking it was a case of tuberculous hip disease. He was surprised to find exactly the appearance of chronic rheumatoid arthritis. He carefully cut away every osteophyte. The boy seemed much better for it.

Some years afterwards he met with the case of a girl of about 19, who could not walk, and had been eight months in a metropolitan hospital after a fall on the hip. He cut down on the joint. The head of the femur was partly gone, what remained was expanded and bare of cartilage. A large mass of bone grew from, or was adherent to, the anterior edge of the acetabulum. This was cut away. Recovery was rapid, and the patient was kept under observation for years, looking well, walking well, earning her living, and only occasionally complaining of a little pain.

Again, in operating for loose cartilage he had more than once found a mass of cartilage with a bony attachment to the articular surface of the femur. By taking away the outgrowth

and *substituting for it a depression*, he had cured one case, and believed another case, now under observation, to be cured.

They would probably admit, *à priori*, that a groove on an articular surface would be harmless as compared with a projection. The harmlessness of a great cavity was shown by the following case: A sergeant-major of the Buffs, a patient of Dr. Fenoulhet of Herne Bay, had ankylosis of a patella to the femur. Separation required the use of a chisel. Mr. Keetley removed the patella altogether, and, in the place of the rough surface between the condyle of the femur, gouged away a deep groove or channel. This was done many years ago, and Dr. Bulger of Holloway reports that the patient still retains the large range of motion in the joint he possessed soon after the operation.

In February last the speaker removed carefully every nodule and projection of bone from the joint-surface of the knee of a gentleman in whom "rheumatoid arthritis" had followed gonorrhœa four years before, and a displaced semi-lunar cartilage seven years before. One prominence was nearly an inch in diameter and tuberculated, though low; another was $1\frac{1}{2}$ inches long, though narrow. *Depressions were substituted*. The lumps were not merely shaved off. No adhesions have followed. The knee is greatly improved.

Passing from the secondary effects of chronic rheumatoid arthritis to the first appearance of the disease, he thought good might be expected from early opening the joint and washing it out with antiseptic solutions. Pyæmic joints could be cured in that way (a case in point was related), even when multiple, which showed that even if the rheumatoid *materies morbi* came to the joint from the blood, radical local treatment was not necessarily contra-indicated.

Dr. WOHLMANN (of Bath) produced the cast of a hand showing the typical lesions of rheumatoid arthritis. As to surgical interference in rheumatoid arthritis, let them be quite sure as to what they meant by that term, as several distinct diseases were usually lumped together under the same name. In Bath, they usually meant by rheumatoid arthritis an acute or subacute specific disease with very definite and well-defined symptoms, and quite distinct from rheumatism, gout, and osteo-arthritis. The name rheumatic gout was absolutely misleading, and he had been unable to find any real justification for the term. It was a disease commonest in women, either from 15 to 30 or at the climacteric, but it also occurred in infants and in men.

Dr. Bannatyne and himself had isolated a diplococcoid bacillus (*Lancet*, April 25th, 1896) from the fluid of affected joints, which they looked upon as the primary cause of the disease.

He had just seen the syllabus of the Buxton Hospital, and noticed that the term "Rheumatoid Arthritis" was omitted altogether; so that, apparently, they did not concur in his opinion as to the essential difference between rheumatoid and osteo-arthritis.

The most striking point in the diagnosis of rheumatoid arthritis was the typical soft spindle-shaped deformity of the fingers and wrists, as in the cast on the table. Those bony-looking swellings would be quite soft to the touch, and there would be no enlargement of the bone at all, as shown by radiographs.

Anything tending to weaken the resisting powers of the patient, such as rapid child-bearing, typhoid or rheumatic fever, predisposed to rheumatoid arthritis; in fact, it was the close analogy of the disease to tubercle that first incited him to search for a bacterial origin.

In one patient, a young woman, he had seen the scars of three successive waves of disease: in childhood she had been attacked by rickets, and had recovered with deep prints of the disease; then had followed tubercle, which had also left its marks, and finally she had all the lesions of severe rheumatoid arthritis.

With regard to surgical interference, in the acute stage all that could be done was aspiration of a distended joint; but later on, when the disease had worn itself out, when osteo-arthritic and fibrous changes—the common end of rheumatism, of gout, of traumatic arthritis—had supervened, then the services of the surgeon could be utilised.

In the acute stages, assuming a causative specific infection, forcible extension of a flexed joint would simply set up general mischief. The only treatment he had found of service was the medicinal one of baths, guaiacol carbonate, and general hygiene.

Mr. TUBBY was of opinion that rheumatoid arthritis was not a local disease, but that the joint conditions were evidences of perverted nerve influences, arising from the accumulation of toxins in the body, due to anæmic and other degenerations. He alluded to the points of similarity between rheumatoid arthritis and locomotor ataxia, and claimed that both were results of interference with the trophic functions of the spinal

cord, but that rheumatoid arthritic changes differed in degree only from Charcot's disease. In supporting the nerve origin of rheumatoid arthritis, the rapid heart, the sluggish pupils, the early and rapid wasting of the muscles in rheumatoid arthritis were alluded to. He thought that the line of future research lay not so much in the direction of bacteriology, but in that of changes in the spinal cord and nerves.

He was glad to hear of the success attained by medical treatment in the early and acute stages, and thought that surgical interference was only justified in the final stage of stiffness and deformity. He advocated repeated and gentle movement of the affected parts under anæsthetics, and thought this gave better results than a single forcible breaking down of the joint, which in his experience resulted in more stiffness and pain than had previously existed. In very stiff and dry joints, Mr. Tubby hoped that more benefit might be obtained by the injection into the joint of sterilised olive oil.

Mr. WILLIAM THOMAS said it seemed in some respects that rheumatoid arthritis pertained to surgery, but mostly to medicine. To him, the important part was when it comes under the hands of the surgeon after its acute stage, and the problem was what they were to do with a stiff deformed joint: he believed the best plan was to open the joint freely, and see the condition inside; he had seen much damage done when rough measures had been pushed too far, and joints made worse by forcible efforts at improvement. He believed that this applied to all kinds of arthritis, whether strumous or not. In every case placed in their hands, it was their duty to make up their minds as to whether there should be an operation or not, and, having decided, to see what changes had taken place, to explore the joint thoroughly, and do the best they could with whatever condition existed.

Mr. PAGAN LOWE considered the medical aspect a very important one, and did not take a pessimistic view of the treatment of rheumatoid arthritis. In private, if not in hospital practice, he found that rheumatoid arthritis was a curable disease in many cases, and under well-directed medical, balneological, and diuretic treatment, together with domestic massage, which should be continued daily for long periods together, many of these cases not only improved but completely recovered. Even that form of the disease which is met with in anæmic girls responded satisfactorily to such treatment. The surgical aspect was in his opinion rather more encouraging than in that of some of the gentlemen who had spoken.

Everything turned upon the proper selection of cases. Articular adhesions should never be broken down when there was fluid in the joints; but that fluid could be safely aspirated, and the adhesions treated later. It was not enough to simply break down adhesions. Every joint after breaking down ought to be strapped, and good results would follow. He believed that many cases of so-called rheumatoid arthritis were cases of chronic gout. Nevertheless such cases were amenable to the same treatment.

Mr. JACKSON CLARKE said he had looked forward to the present meeting with great interest. They had learnt something of the pathology of the disease. He might say that in making considerably over 2,000 autopsies, he had opened hundreds of these joints and had never found any evidence to connect the disease with rheumatism; he had always regarded it as being more closely associated with gout than with rheumatism. He had spoken of it as "osteo-arthritis." That was but an indifferent term, as the condition affected the whole of the body.

With regard to Drs. Bannatyne and Wohlmann's interesting work, he would like to have seen this bacillus under the microscope.

As to the anatomy of the cases, they had heard of the breaking down of adhesions, but he had never seen true adhesions in osteo-arthritis.

Referring to the age incidence, he had under his care a child aged three suffering from typical osteo-arthritis; she developed an angular curvature of the spine, not tubercular. That child, with cod-liver oil and iron, had improved markedly; the deformities, due to effusion into joints and enlargement of the articular ends of the bones, though still marked, had diminished.

In several instances of osteo-arthritis affecting the knee he had had the joint supported by side-steels. He thought a great number of these cases came within the scope of orthopædic treatment and were much benefited thereby.

Hot-air treatment had been tried, but in the particular case which he remembered it did no good at all.

Some of the patients were fat, so that he could not say that the loss of subcutaneous fat was a constant factor.

Where in a case there were a lot of loose bodies he should not hesitate to remove them from the joint. He was struck by Dr. Pagan Lowe's remarks as to the utility of the medical treatment, and they should give that the first consideration.

He had seen many cases of successful treatment by the waters in Bath.

He felt they had gained a great deal in the discussion that night. In pathology he considered the disease an inflammatory one due to auto-intoxication.

Mr. NOBLE SMITH said that, acting upon the belief that the disease was a chronic inflammation, he had in various cases drilled into the bone in the neighbourhood of the joint, a proceeding which had given him good results in tubercular joint disease. In two or three rheumatoid cases the symptoms had disappeared rapidly after the operation. He thought that it probably relaxed tension and started healthy changes.

Dr. MELSOME considered the disease an infective one, and had seen several instances in children of puffy swelling of nearly all the joints of the upper and lower extremities, combined with marked swelling of the lymph glands in the axilla and groin and neck. There was very little febrile disturbance, the joints and glands were seldom tender, and the children could run about. He had also seen one instance in a man of 22 years. The condition was very refractory to treatment, and appeared to be an acute form of the disease which usually runs a milder course, and ends in secondary arthritic changes. He thought that the infection occurred through the tonsils and genital organs.

Mr. NOBLE SMITH referred to a conversation he had had five or six years ago with the late Dr. Freeman of Bath, who had come to the conclusion that the great majority, or a very large number, of cases of rheumatoid arthritis (in women) were due to septic inflammation, and that in almost all cases he had traced a history of suppurative affection of the uterus or its appendages.

Dr. GRIFFITHS, replying on the discussion, said they had gained a great deal of useful information, although he somewhat regretted that they had dropped into the medical aspect more than the surgical. He had been anxious to hear what was to be done when osteophytes were the prominent signs. Time did not allow him to dwell upon the remarks that had been made, but he felt indebted to those who had given their views. There were many points which had been advanced during the discussion, and he felt sure they would all act upon them to the best of their ability.

A cordial vote of thanks was accorded to the Governors of

the Royal Mineral Water Hospital for the use of the room, and to those gentlemen who had taken part in the arrangements for the visit of the Society.

Fifteenth Ordinary General Meeting,

Held at the NATIONAL ORTHOPÆDIC HOSPITAL, LONDON,
Friday, October 21st, 1898.

Eleven members and visitors were present, and Mr. TUBBY was voted to the chair.

The minutes of the last meeting were read and confirmed.

Mr. F. M. Fellows, M.B., C.M. Edin., was duly elected a member of the Society.

The following skiagrams were exhibited by Mr. MUIRHEAD LITTLE :—

Fracture of the leg, with fibrous union of the tibia and bony union of the fibula, at an acute angle, before and after operation.

Greenstick fracture of the shaft of the ulna, followed by imperfect growth of the lower end.

Congenital defect (amputation?) of leg and foot.

Congenital deformity of fingers.

Hallux valgus.

Severe congenital talipes equino-varus in an adult with supernumerary toe.

Paralytic talipes calcaneo-valgus.

Mr. FREER showed skiagrams and photographs, and a modification of Holland's instep arch made of spongy rubber similar to that used for making lacrosse balls. The advantage claimed for these arches was that they were most resilient and comfortable to wear, and did not cause horny thickening of the skin, which was the main disadvantage of more solid arches.

Mr. MUIRHEAD LITTLE showed three cases of Nicoladoni's operation of tendon transplantation, with a skiagram of one of them—one of the patients having been shown at the February meeting, when a wish was expressed to see him again. He had not gained in power since then; in fact he thought the tendon was a little elongated. He also showed a girl operated on in January last, when the peroneus longus was inserted into

the tendo Achillis. Unfortunately the wound suppurated freely, in spite of which there had been some improvement. He also showed a little girl operated on in a similar manner. This latter patient showed an excellent result. He thought the kangaroo tendon used for suture was responsible for the suppuration in the second case.

Mr. HORROCKS OPENSHAW showed a case in which, after exposing and dividing the peroneus longus by the tenotome, he had exposed the tibialis posticus; then passing in the forceps through an incision in front of the tendo Achillis, he drew the peroneus longus across the back of the leg and stitched it to the tibialis posticus, with the idea of correcting the valgus by diminishing the power of the peronei and increasing the power of the tibialis posticus. The result had been fairly good and he anticipated further improvement, as the peroneus longus was beginning to act.

He also showed a young man with calcaneus. He had spliced both peronei into the tendo Achillis. He feared, however, that he had not sufficiently shortened the tendo Achillis, or rather that he had not put enough traction on the peronei before suturing them, so that until they contracted more the patient would not get good power from the heel. The operation was done five months ago. Here too he had used kangaroo tendon, and again profuse suppuration resulted. He also showed a case of calcaneo-valgus operated in the same way. In this case there was a marked improvement, though movement was not yet perfect.

Mr. TUBBY showed a case of calcaneo-valgus in which he used peroneus longus to reinforce the tendo Achillis, fixing it with silk sutures. He generally made a big incision, extending far up the leg. The result on the whole was very satisfactory. On admission the patient had no power in the calf muscles; he still had some valgus, but not more than could be corrected by the use of an instrument.

He also showed a boy with paralytic equino-valgus. He had split the tendo Achillis for some distance; he then struck half the tendo Achillis into the peroneus and cut through the remaining half. He operated two months ago, and though there was not very much power as yet, he thought that the case would do well. There was not much valgus left.

CASE OF CONGENITAL DISLOCATION OF THE HIP TREATED BY OPEN OPERATION.

Mr. TUBBY showed a case of congenital dislocation of the hip treated by the open method. Mr. Robert Jones and he had done this case together at the Evelina Hospital. The patient was a girl, aged 12, and she had $2\frac{1}{2}$ ins. shortening. It was not a case of paralytic dislocation. He had tried the reduction method, but ultimately made an anterior incision. The chief difficulty in the operation arose from the condition of the capsule, which was at least half an inch thick. When they opened the capsule there was a gush of dark blood, due to the previous manœuvres. There was a rough, bony prominence at the site of the acetabulum. They made a square surface on the inner aspect of the head of the femur, and roughened the bony prominence at the site of the acetabulum, and endeavoured thus to produce fibrous ankylosis. They then cut two-thirds through the neck of the femur and gave the shaft a twist, thus correcting the inversion. There was now very little telescopic movement, but the shortening remained. The neck of the femur in this case was horizontal, which gave rise to shortening that could not be remedied. He thought the point was to prevent further upward movement and not to remedy the shortening, which could be compensated by the use of a cork sole. The operation was done in July.

Mr. REEVES said he had always been opposed to these operations, but he was still open to conviction. Mr. Tubby had said that the best result to be hoped for was to get some fibrous ankylosis, but it was early as yet to come to any conclusion as to the result of this case. He suggested, however, that the worst that could happen in these cases, without operation, was not so very terrible. The child could run, jump, and get about, and he thought that, logically, the operation was quite uncalled for. He mentioned that in a case of his own in which the patient went to the Continent to be operated upon, she returned very bad indeed, and was not benefited at all, but the contrary. As for so-called reposition operations, they were simple madness. He would like to see Mr. Tubby's patient in a year's time, and if the patient could then get about as well as a similar untreated patient he would admit that the operation had done no harm. He contended that treatment by attempted reduction, extension and the use of a splint was not Lorenz's method. He himself had had a

considerable number of cases treated by that method before Lorenz had used it, and he observed incidentally that these cases ought to be shown before operation, either in the person of the patient or in casts or photographs or skiagrams. There was a large number of cases of dislocations attending at the Royal Orthopædic Hospital, and he had found that many of them were not, as he thought, posterior displacements. The experience of the last two years had shown him that the larger number of cases were anterior dislocation, and he asked if that was the general experience. In cases of anterior dislocation the treatment by extension was considerably easier; there was less shortening, and it was much easier to extend the limb and to keep it in place if they allowed for extending the knee by making a splint so as to keep up the extension at the hip while allowing movement at the knee. If any open method were advisable, he had thought out a plan, which was to drill a hole through the neck and head by an incision on the outer side of the trochanter and into the os innominatum; but he had been afraid that the ivory peg which would have to be inserted to keep the bone in place would not hold, and that he might perforate the ileum. At any rate, this plan seemed to him more promising, should an open operation be necessary, than the method of Hoffa and Lorenz, which had failed; but he thought that open methods should, generally speaking, be abandoned as unjustifiable.

Mr. OPENSHAW did not consider that a very good result had been obtained in the case shown by Mr. Tubby. At one time he might have thought so, but not now. He himself had performed six operations of the kind. The history of the operation was that Hoffa had commenced and Lorenz had improved this method by transferring the incision from the back to the front, where he divided few, if any, muscles. Then he began to reduce the dislocation after tenotomy by manipulation and abduction. He himself had started by adopting Lorenz's method of reaching the joint by the anterior incision. The girl in his first case was much too old; and instead of his bringing down the hip into its place before he started, he had trusted to dividing the muscles and getting it into place by traction. That attempt took an hour, but ultimately he did manage it, and got the head opposite the acetabulum. He had had five other operations of the same calibre with more or less success. Only two he considered were really successful, though four were quite as good, if not better, than the case shown to-night. His own experience

was that there was always an acetabulum. If they set out with the idea that it was doubtful whether there was an acetabulum, they would probably not find it in their first cases, because the operation was a big one, the parts were all disturbed, and one got lost. Moreover, the acetabulum was covered by a thick, narrow capsule, so that by a narrow opening, which would just admit the tip of the finger, one got down into it. He himself had found a narrow triangular acetabulum in every case in which he had operated. He concluded that the operation was best done by reducing the shortening before beginning to cut. He was indebted to Mr. Robert Jones for this suggestion. In the case of a girl with $2\frac{1}{2}$ inches shortening, he had succeeded in reducing the shortening in five sittings; he manipulated the head of the bone opposite the acetabulum by flexion, rotation inwards, circumduction, and abduction, and then he put the leg up in the fully extended position. In from six to eight months, by four or five attempts, he had brought down the leg to the normal position, and at present the patient walked about with a movable hip joint. The result, in fact, was as perfect in that case as it well could be. One could not put the head into the acetabulum because this was not big enough to receive it, but he thought the pressure did ultimately deepen the acetabulum into a more or less cup-shaped cavity. He had seen the triangular fibro-cartilage in every case in the skiagrams shown him by Mr. Little. The deformity was often associated with genu recurvatum, and he thought it was often the result of intra-uterine injury or malposition.

Mr. EVE agreed with Mr. Openshaw as to the presence of the acetabulum. He had seen a considerable number of these cases in the *post-mortem* room, and in pathological specimens one could judge of the position of the parts better than in the course of an operation. He had never seen a pathological specimen in which the acetabulum was absent, though it was always small and triangular. He did not, however, agree with Mr. Openshaw as to the capsule. In all his own cases the capsule had been exceedingly large and dilated.

Mr. OPENSHAW said he meant that the capsule was constricted close to the acetabulum.

Mr. NOBLE SMITH observed that the principal point was whether the head of the bone could or could not be brought down by manipulation. The two classes of cases seemed to have been mixed up together. If they could get the head down, either at once or by prolonged traction, into its proper position, he took it that no further operation was justifiable,

because there was much evidence to show that the bone could easily be kept in the improved position. The head of the femur would make a place for itself in time. They knew, for instance, that in old cases of ordinary dislocation a socket was formed by the prolonged pressure of the bone in its new situation. Therefore, when it could be brought down to anywhere near its natural position, they ought by pressure to keep it there—say for two years, eighteen months lying down, and the rest of the time getting about with a high heel on the boot of the sound side. It was in cases where the head of the bone could not be drawn down that he doubted what should be done. Mr. Tubby's case seemed to have been one of that kind, for at the operation there was found a thickened anterior part of the capsule which prevented reduction. Then came the question raised by Mr. Reeves whether operation would produce benefit or not. He had given the matter some anxious thought, because he had some cases on which he would very much like to operate if a good result could be assured. If, therefore, Mr. Tubby would bring forward his case later on he should watch it with the greatest interest, because it seemed a nearer approach to success than any he had yet seen. Of those he had seen so far there had been more failures than successes. With regard to the cases in which the bone could be pulled down into position, he was aware that they were said to relapse. He had only one such case of which he could speak as having been treated thoroughly. There was in this case $2\frac{1}{2}$ inches shortening of one leg. He first of all cut the abductor longus which was holding it up along with the tensor vaginae femoris. He was then enabled to get the head of the bone down to a considerable extent, and in about three weeks it was down to its normal position, and it was kept there for eighteen months by mechanical means. At the end of two years he allowed the patient to get about. He had recently seen that patient after three years of walking about, and he found no external appearance of any deformity, and there was no difference as compared with the natural leg, the shortening being less than half an inch. That might be an exceptional case, but if such a result could always be attained no operation was required. The question remained what they were to do with the patients in whom the bone could not be brought down. He himself had not operated hitherto, because so far he had not seen sufficiently good results.

Mr. MUIRHEAD LITTLE said he had treated many of these cases, both by the modified Buckminster Brown method and

by Lorenz's method, but the results could scarcely be described as satisfactory. He was more sure than ever that if they were to get good results the head of the bone must, as a preliminary, be brought down to the level of the acetabulum. Unless they could get the bone down before beginning the manipulations, they were doomed to failure. As for telescopic movement, it was the exception rather than the rule.

Mr. KEETLEY remarked that there were many points on which one could not help disagreeing with everyone, and particularly with one's self. However dogmatic he might be in manner, he did not really wish to be dogmatic upon any point. His experience was comparatively small. Even Mr. Openshaw's experience, though relatively large, was really small as compared with that gentleman's experience of many other operations. He himself had only done two. With regard to the presence of an acetabulum: In his two cases, one was 12 and the other 13 years of age. He did not in the least degree get lost. He knew where he was all the time. In the child of 13 he discovered what felt like the remains of the outer rim of that cavity, just a slight elevation of bone. He then reflected a large flap of muscle and cellular tissue that covered the bone, and there was nothing resembling an acetabulum under it. He almost laid bare all that part of the bone where that cavity would be in an ordinary subject; he turned the flap upwards, but found no acetabulum, and he did not believe there was anything worth calling by that name in this case. He asked Mr. Eve how the specimens he had referred to as being in the museums had got there.

Mr. EVE said one at St. Bartholomew's was the pelvis of an adult woman, one the ilium with the femur of an adult man, and the others were children, and in all the acetabulum, though small, was definitely present.

Mr. KEETLEY (continuing) observed that it appeared that there were few cases, and that was quite consistent with what he was about to say. In the other child of 12 there was an acetabulum, but it was a very small triangular thing, into which one could perhaps get the end of the finger. In very young children the acetabulum could frequently be recognised without any operation at all. Then as to the capsule, he did not think that this acetabulum when he did discover it had any connection with the capsule at all; in fact, he was sure there was no such connection, and that if the capsule had anything to do with it at all it was simply by fibrous tissue which was adherent to the remains of the acetabulum. It was

quite contrary to one's experience of joints in any other part of the body that the capsule should enclose any part of the joint which had not been used for say 13 or 14 years. Could anyone tell them of any other joint in the body in which the capsule lined by synovial membrane enclosed a part of a joint entirely unused? The capsule, under these circumstances, always ceased to be anything like a capsule, but became merely a piece of adherent fibrous tissue. If they put upon the depression the head of a bone three or four times as large as that depression, he thought it was most unlikely that the large head of the bone would ever have any effect at all in dilating that cavity. He could quite believe that if one took a very young child, say between 3 and 5 years of age, where one could make the head of the bone slip in with a click, if then they could keep the head of the bone in that position for a sufficient length of time the acetabulum might develop and increase in size. But he would not be disposed ever to attempt to treat children of 13 by anything but an open operation.

With regard to very small children, since he had heard what Mr. Reeves had to say some time ago, he had tried to carry out Lorenz's method, but found it very tedious and troublesome. With regard to the operation itself, he agreed with Mr. Openshaw and Mr. Jones that extension before complete operation was a good thing, but he thought that the first thing to do was to divide the structure which prevented extension. Both his own cases had had a long spell of extension before he had divided anything, and it made very little difference. Then he made an incision, and divided everything that seemed to prevent the head of the bone from coming down, and he found that the capsule was really the principal obstacle, though he had obtained a distinct result from dividing various other structures, such as the tensor vaginæ femoris and the fascia around it. He also divided much of the psoas and iliacus and various things which he did not recognise. He ultimately succeeded in getting the bone well down in each case. He did not attempt to make an acetabulum until he had persisted with extension for a long time.

Before he had operated on one of the patients he had a leverage machine made and kept up the extension for 20 minutes, with tension equal to 60 pounds. As soon as he had cut through the capsule he had no difficulty in getting the head of the bone down to where the acetabulum ought to be. He tested that by having an os innominatum before him while performing the operation. Lastly, he thought the main

point in the operation was to make the new acetabulum big enough.

In a second case, where he had found a little acetabulum, he was so pleased with it that he did not like to interfere with it very much. In consequence, he was unable to keep the head of the bone in place, and he had to do the operation over again. The first case was very successful. The three inches shortening had been reduced to one inch, and the limb could be flexed to an angle of 90° . He attached much importance to turning out a flap of the soft tissues covering the place where one was going to make an acetabulum, turning it back again when this had been done, so that it covered the rough bone where the head of the femur pressed and prevented bony ankylosis, thus increasing the mobility and lessening the pain. He recalled that it was Ogston who first proposed making an acetabulum, but he had come to the conclusion that it was better not to make one in the ordinary place, and he had practically adopted excision. It was absurd to call an operation after this or that surgeon, merely because he divided this or that muscle.

Mr. NOBLE SMITH referred to the case of a lady who came to him a year since, complaining of pains in the hip joint of some months duration, which were attributed to rheumatoid arthritis. Under rest and treatment these went away, but he had a radiograph taken of her hips, whereupon he discovered that she was the subject of double congenital dislocation, though she had never had an idea that there was anything of the kind the matter with her hips. It was evident, therefore, that some cases did well without treatment of any kind.

Mr. REEVES recalled a demonstration he had given, in which he had pointed out in his conclusions that whether the dislocation was dorsal or uot, he did not attempt to get the bone into place, because he did not believe that there was an acetabulum. There was no difficulty in converting a dorsal dislocation into an anterior one, and there one got a sort of false acetabulum, and in any event one obtained a lengthened limb.

Mr. TUBBY observed that on the subject of congenital dislocation, speakers varied from extreme dogmatism to great dubiousness. No doubt that was due to the curious nature of the affection. He did not, himself, believe that there was any one way of treating this condition, and every succeeding year in a patient's age made a difference in the line of treatment to be adopted. There could be no doubt that

the acetabulum was absent in some cases. With regard to this particular case, Mr. Jones agreed that there was no acetabulum. With regard to the question of forcible reduction, the Lorenz method might possibly succeed in some children, but not when they were over 8 or 9 years old. One reason for this is that the head of the bone is out of shape, and is altogether too large for what was left of the acetabulum; secondly, the capsule was too thick; thirdly, you might move the head about freely, and you would not be able to get it into the acetabulum because the femur is out of all normal relation to the os innominatum. He had grave doubts as to the future of this method of extension and reduction, except, in children under 7 or 8 years of age, the old method of open operation. He quite shared Mr. Reeves's views about the Lorenz results. He had looked through the literature of the subject, and its perusal had left him in the greatest doubt as to the accuracy of some of the recorded cases.

Mr. JONES agreed that no acetabulum was present, although looked for at the spot where it ought to be. It was interesting to hear Mr. Eve's pathological report, but Lorenz had figured several pathological specimens in his work where there had been only a small acetabulum, and this was consequently a point not to be controverted. With regard to treatment, he did not wish to speak dogmatically, as at present he was trying quite a number of different things. In little children it was well to try a simple reduction, keeping the leg in the abducted position; but with older children that was of little avail, and in them the result was always a failure. They could get false ankylosis by pressure of bone if well maintained. That he had often seen in old dislocations where he had performed sham reduction with ultimate fair movement. He recalled the case of a doctor's daughter with four or five inches shortening, in which by special training all defect of gait had been overcome. In other cases he had retained the pull, and he thought it was necessary to have full extension before any operation was done. He had tried to produce some thickening just above the site of the acetabulum with a chisel to prevent the bone slipping up again, but the results had been very uncertain.

A vote of thanks to the Committee of the Hospital for the use of the rooms concluded the proceedings.

Fourth Annual General Meeting,

Held at the WESTMINSTER HOSPITAL,
Friday, December 9th, 1898.

Mr. TUBBY was voted to the Chair.

The minutes of the last Annual General Meeting were read and confirmed.

The Honorary Secretaries' report was read and adopted.

Mr. E. Luke Freer's term of office as Provincial Honorary Secretary having come to an end, it was decided on the motion of Mr. TUBBY, seconded by Mr. LITTLE, that Mr. Thurston Holland be asked to act as Provincial Honorary Secretary.

The following resolution was proposed by Mr. LITTLE, seconded by Mr. TUBBY, and carried unanimously:—

“That the best thanks of this Society be given to Mr. E. Luke Freer, the retiring Provincial Honorary Secretary, for his great and valuable services to the Society at its inception and during the past four years, during which he has discharged the onerous duties of his office with rare tact and unflinching courtesy.”

Mr. C. R. B. Keetley was re-elected Honorary Treasurer.

The following members of the Council retired in rotation:—Messrs. T. H. Openshaw and B. E. Brodhurst, and Mr. Thelwall Thomas resigned his membership in October.

The following members were elected to fill the vacancies on the Council:—Messrs. Luke Freer, Robert Jones, and William Thomas.

Messrs. Vincent Moxey and Septimus Sunderland were elected Auditors.

Messrs. Tubby, Freer, Jackson Clarke, the Honorary Treasurer and Honorary Secretaries were elected as Transactions Sub-Committee.

The Sub-Committee for Collective Investigation of Congenital Displacement of the Hip were re-elected.

HONORARY SECRETARIES' REPORT.

Your Honorary Secretaries, in submitting the Fourth Annual Report, congratulate the members on the work of the past year. The number of Ordinary Members remains the same as last year, namely, thirty-six, but the names of three candidates are up for election at the ensuing Ordinary Meeting. Dr. Rawdon, having retired from active practice, has been elected an Honorary Member. There are also six well-known American Orthopædic Surgeons as Honorary Corresponding Members. Only one resignation has occurred during the past year, so that in point of numbers the position of the Society is highly satisfactory, one new member having been elected.

Four Ordinary General Meetings have been held, three in London and one in Bath. Interesting discussions on fibrous ankylosis, flat foot, rheumatoid arthritis, and congenital hip displacement have taken place, and many clinical cases, specimens, skiagrams, photographs and instruments, all bearing on Orthopædic practice, have been shown.

The attendance of members has been quite up to the average, and a marked feature has been the attendance of visitors at the meetings, demonstrating the increasing interest of non-members in the work of the Society.

The Provincial Meeting, at Bath, was a most enjoyable one, the members being specially interested in the antiquarian relics at the old Roman bath. The Royal United Hospital and the Royal Mineral Water Hospital were also visited. The discussion on rheumatoid arthritis, opened by Mr. C. T. GRIFFITHS, at the Ordinary General Meeting was most appropriate. Several of the local surgeons attended as visitors, and took part.

Your Council has decided that in future the *Transactions* shall be published biennially, as, the Society only meeting four times a year, by so doing a more substantial volume will be produced.

The Committee elected to investigate congenital displacement of the hip, has not at present been able to submit its report.

The best thanks of the Society are due to those members who by the exhibition of cases, etc., have so largely assisted in adding to the interest of the meetings.

The period of office of the Provincial Honorary Secretary expires with this meeting, and it will be necessary for the Society to elect a successor.

Sixteenth Ordinary General Meeting,

Held at the WESTMINSTER HOSPITAL,
Friday, December 9th, 1898.

Mr. TUBBY was voted to the Chair.

The minutes of the last Ordinary General Meeting were read and confirmed.

The following candidates, whose names, previously approved by the Council, had been submitted to the Ordinary General Meeting on October 21st, were duly elected members of the Society:—Arthur Stanley Wohlmann, M.D., B.C., M.R.C.S., &c., 9 Gay Street, Bath; William Edward Bennett, F.R.C.S. Eng., L.R.C.P.Lond., 27 Temple Row, Birmingham; William Stanley Melsome, M.A., M.D., B.C., 29 Circus, Bath.

In the unavoidable absence of Mr. T. Horrocks Openshaw, his paper on "Tendon Re-implantation" was read by Mr. MUIRHEAD LITTLE.

ON TENDON IMPLANTATION.

PAPER BY Mr. T. HORROCKS OPENSHAW.

It were well, perhaps, in the first place, that we should clearly understand what we mean by tendon implantation. Let us define it as the transference of the tendon of a healthy muscle from its normal situation, and the attachment, or implantation, or grafting of it upon the tendon of a muscle which is more or less completely paralysed.

A brief *resumé* of some of the recorded cases in which this operation has been performed may be of interest, as illustrating its history and its gradual but continued extension.

We owe the initiation of this operation to that grand orthopædic surgeon, Nicoladoni. The first case operated upon was one of paralytic talipes calcaneo valgus, and is recorded by him in 1881 in the *Archives fur Klinische Chirurgie*, 27 band, heft 3, page 660.

The following are briefly the notes of the case.

I., aged 16, had suffered from infantile paralysis of both legs since he was 2 years of age. His right leg, in April, 1881, was 3 c.m. shorter than the left, the calf muscles were completely atrophic, the right foot was in a position of aggravated calcaneus with some valgus. Plantar flexion was impossible. The peronei were active. The extensors enfeebled.

On April 15th, 1881, by means of one incision 12 c.m. long, parallel with the posterior border of the fibula from the external condyle upwards, and another incision from the external condyle backwards to the heel, the tendo Achillis as far as the muscle and the peronei were exposed. Both peronei were divided at the malleolus, withdrawn from their sheath and inserted into the tendo Achillis, which had been split longitudinally with a bistourie, and were then sutured with silk. The wound sloughed somewhat and took seven weeks to heal. The patient was allowed to walk in the seventh week.

On July 14th voluntary plantar flexion was possible. This continued to increase, and the improvement in power was marked when six months afterwards the patient was shown at the Salzburg Surgical Congress. This was in 1881.

Twelve years later, in 1893, Pochas of Lille operated upon a child aged 4, with marked paralytic valgus of the left foot following convulsions at the age of 1, for which electricity had been exhibited for three years without result. The calf was wasted, the tibialis anticus and posticus paralysed, so that no adduction of the ankle was possible. There was very free movement at the mid-tarsal joint. The extensors were active, dorsiflexion increased. In walking the astragalus rested upon the ground; the foot was markedly valgoid.

Dr. Pochas exposed the tendons of the tibialis anticus and extensor proprius pollicis, divided and fixed the central end of the tibialis anticus, button-holed the tendon of the extensor proprius pollicis, split the tibial tendon and passed the ends through the pollicis tendon, and sutured with fine silk. The wound healed rapidly.

Nine weeks afterwards the child's gait had improved, but some valgus remained even when at rest, which was attributed to the paralysis of the tibialis posticus and other deep sural muscles.

Two years later, in 1895, Milliken of New York, in the *New York Medical Record*, published what he termed "A new operation for deformities following infantile paralysis, with the report of a successful case."

The case was one of slight paralytic valgus of eighteen months' duration in a boy of 9, where the tibialis anticus only was paralysed, the other extensors acting normally.

The operation consisted in exposing tibialis anticus and extensor proprius pollicis tendons by an incision $1\frac{1}{2}$ inches long just below the anterior annular ligament; in splitting each tendon longitudinally—the tibialis from above down, the pollicis from below up; in dovetailing the split tendons into each other, and suturing them together. Kangaroo tendon was used as suture material. The foot was put up in plaster, and is said “not to have united primarily, but that there was no pus.”

When seen five months afterwards the Whitman's brace which he had worn for two years could be dispensed with, and the power of voluntary adduction of the foot is said to have been perfect.

In 1894, Goldthwait of Boston still further extended this operation, and published three cases.

The first case, a young woman, aged 19, with paralytic left calcaneo-valgus of extreme degree since 9 months old. The leg one inch short; the posterior muscles all paralysed except the peronei; the extensors normal. By means of an incision, four inches long, the peronei and tendo Achillis were laid bare behind the malleolus. The peroneus brevis was attached to the flexor longus pollicis, and the peroneus longus to the tendo achillis. The foot was put up in plaster in the extended position. The wound suppurated, but when healed the patient needed only a valgus sole plate.

It will be observed that this operation is really only a modification of Nicoladoni's, the peroneus brevis being sutured to the flexor longus pollicis instead of into the tendo Achillis.

CASE 2.—A boy, aged 13, with paralytic calcaneo-valgus of the right foot of eleven years' duration. All the muscles of the leg paralysed except the peronei, the extensor communis digitorum, and peroneus tertius. Walking was impossible without a crutch or a walking instrument extending up to the knee.

Upon this boy the preceding operation was repeated, viz.: The peronei were implanted into the tendo Achillis and flexor longus pollicis; and some weeks later, by means of an oblique incision in front of and just above the ankle, the peroneus tertius and outer half of the tendon of the extensor communis digitorum were sutured to the paralysed tibialis anticus tendon. The foot was dressed, put up in plaster of Paris, and healed by

first intention. The result is reported as excellent, the valgus as completely cured.

CASE 3.—Left paralytic equino-valgus of ten years' duration in a boy of 12. The tibialis anticus paralysed, the extensor proprius pollicis paretic. The tendo Achillis contracted and cured by tenotomy.

The tibialis anticus tendon was split longitudinally from above down and attached to the peroneus tertius tendon, which was detached from its normal insertion into the fifth metatarsal bone. The result was most satisfactory. The valgus was quite corrected, the patient walking with a perfectly straight foot and without apparatus.

During the past year my colleague at the London Hospital, Mr. Eve, has repeated this operation and extended it. Four cases are published in the *British Medical Journal* :—

CASE 1.—A child of 11, with talipes equino-valgus, the tibialis anticus and extensor communis digitorum being paralysed; the tibialis posticus tendon was divided near its insertion into the scaphoid, detached, and passed round the internal malleolus and sutured to the tibialis anticus. The peroneus brevis was next exposed, divided, detached, passed round the external malleolus and sutured to the extensor communis digitorum, the equinus being treated subsequently by tenotomy of the tendo Achillis.

CASE 2.—A child of 3, operated upon in November, 1897, with paralytic equino-valgus of the right foot; foot drop and eversion from paralysis of tibialis anticus and posticus. The procedure consisted in implanting the peroneus brevis into the tibialis anticus and the peroneus longus into the extensor communis digitorum, the peronei being detached and passed round the fibula in order to attach them to the extensor muscle tendons.

In neither of the above cases is the result stated to be satisfactory, and my criticism of the first case would be that the transference of the tibialis posticus from the back of the internal malleolus would tend to increase rather than diminish the valgus. And in the second case, that a child of 3 is too young to enable one to be confident that the operation of tendon grafting is or ever will be a necessity.

CASE 3.—Operation in December, 1897, upon a child aged 6, with extreme equino-varus, due to paralysis of the peronei and extensor communis digitorum. In this case the tibialis anticus was split, the outer part being passed across the front of the leg and attached to the peroneus brevis near its insertion, and therefore in front of the external malleolus.

Next the tibialis posticus tendon was cut near its insertion, passed round the tibia and attached to the extensor communis digitorum. For the cure of the equinus, the tendo Achillis was subsequently tenotomised.

Ten months afterwards the child walked well and could dorsiflex the foot, the adduction was cured.

It will be noticed that in the above three cases talipes equinus was present, and this renders it difficult to be certain that tenotomy of the tendo Achillis was not responsible for a considerable part of any improvement resulting. I would, therefore myself always tenotomise the tendo Achillis first, and subsequently, if then found necessary, perform the operation of tendon implantation.

The fourth case was a youth aged 9, whose external popliteal nerve had been lacerated and severed, with consequent paralysis of peronei and extensors, and resulting talipes equinovarus. Resection and reunion of the nerve had been tried without benefit. In this case, on March 17th, 1898, the tibialis posticus was exposed, severed at its lower end, passed round the internal border of the tibia and grafted upon the extensor communis digitorum tendon. Next a strip of the outer edge of the tendo Achillis was separated, detached at its lower end, and this strip was passed round the fibula and attached to the peroneus longus on the outer side of os calcis. The result is recorded as excellent: in five weeks the patient could walk firmly, and could dorsiflex the foot.

In this case it will be observed that a part of the tendo Achillis is detached and made to act as a dorsiflexor instead of a plantar flexor of the foot.

Vulpus has made still further use of the tendo Achillis, in a girl of 18 whose extensor muscles were paralysed, with consequent talipes equinus. He divided the tendo Achillis longitudinally into three strips: the inner strip was detached at its lower end, passed round the inner side of the tibia and implanted upon the tibialis anticus; the central strip remained undisturbed; the outer strip, detached below, was passed round the fibula and attached to the peroneus longus in front of the external malleolus.

By this operation the foot drop was cured, and the girl was able to walk well without the aid of any apparatus.

From the preceding list of recorded cases it will be apparent that almost every tendon near the ankle has been utilised to strengthen every other muscle when paralysed. It will be of advantage that the members of this Society should discuss the relative advantages of each procedure. Let me

briefly epitomise what may be done to replace any individual muscle when paralysed:—

1. For paralysis of the *tibialis anticus*.

- a.* A strip of *extensor proprius pollicis* may be attached to it.
- b.* Its lower end may be attached bodily to the side of the *extensor proprius pollicis*.
- c.* Half the *extensor communis digitorum* may be attached to it, and later the *extensor communis digitorum* may be strengthened by means of the *peroneus brevis* or *tertius*.
- d.* The *tibialis anticus* and *extensor proprius pollicis* may be united at their muscular parts.
- e.* A strip of the *tendo Achillis* may be implanted upon the *tibialis anticus*.
- f.* The *tibialis anticus* tendon may be implanted upon the *tendo Achillis*.

I cannot myself say from personal experience which of the six methods I consider the best, but it seems to me illogical to attach the *tibialis anticus* (a *dorsiflexor*) to the *tendo Achillis* (a *plantar flexor*). I think it is preferable to use either the *extensor proprius pollicis* or common extensor of the toes, both of which have somewhat the same action as the muscle paralysed. It must always be remembered that there are many tendons in front of the ankle, and sloughing has in several cases been recorded as the result of the prolonged manipulation necessary. With strict asepsis the danger of sloughing of tendon, however, ought not to be great.

2. For paralysis of the *extensor proprius pollicis*.

- a.* The *extensor communis digitorum* may be split and one half sutured to the *pollicis* tendon.
- b.* The *tibialis anticus* may be split and one half sutured to the *extensor proprius pollicis*.

The first of these two procedures is, I think, preferable, because the *tibialis anticus* is rarely active when the *extensor proprius pollicis* is paralysed, and again it seems appropriate that the *extensor communis digitorum* should be made to lift the great toe.

3. For paralysis of the *extensor communis digitorum*.

- a.* The *extensor proprius pollicis* may be implanted upon it.
 - b.* The *peroneus brevis* tendon
 - c.* The *peroneus tertius*
 - d.* Both these *peronei*
- } may be made use of.

4. For paralysis of the *peronei*.
 - a. A strip from the tendo Achillis may be sutured to the peroneus longus.
 - b. Half the tibialis anticus may be grafted to the peroneus brevis.
 - c. Both procedures.
5. For paralysis of the calf muscles (tendo Achillis).
 - a. The peronei
 - b. The peroneus longus only
 } may be sutured to the tendo Achillis.

I have performed this operation on four cases, and the results are excellent.

6. For paralysis of the tibialis posticus.
 - a. A strip of the tendo Achillis may be utilised.
 - b. The peroneus longus or brevis may be attached.

The latter operation, which I think is original, I have performed upon some half-dozen cases, and I think it may fairly be considered one of the most satisfactory instances where tendon grafting results in benefit. Two of the patients were shown at the last meeting of this Society.

The notes are briefly as follows:—

CASE 1.—Y. T., a girl, aged 8, with paralytic talipes valgus of the right foot, due to paralysis of tibialis posticus and other plantar flexors. The internal malleolus was very prominent. On July 15th, 1898, the peroneus longus was sutured to the tibialis posticus. On August 26th the foot was distinctly in a better position, but no power was perceptible in the new muscle. At the present time there is slight power in the tibialis posticus, and the improvement in the valgus position of the foot is maintained.

CASE 2.—H. L., boy, 13, with paralysis of lower extremities, the left extensively, the right foot was valgoid, and there was weakness of the tibialis anticus, posticus and extensor proprius pollicis. In this case also some benefit has resulted.

The steps in the operation are as follows:—The tibialis posticus is exposed for two inches behind the internal malleolus. The peroneus longus tendon is exposed for one inch at a spot one inch above the external malleolus. The peroneus longus is then cut at the os calcis by subcutaneous tenotomy, and its tendon drawn upwards out of its sheath. From near the upper end of the exposed tibialis posticus, a probe is passed outwards in front of the tendo Achillis and made to project through the open sheath of the peroneus longus. This tendon is fastened to the probe, and is thus drawn inwards into the sheath of the tibialis posticus. The tendons are then each

freshened on the surface and are sutured together. I feel that I can confidently recommend this operation in cases of valgus with paralysis of the tibialis posticus.

Having reviewed the procedures which may be adopted, let us consider what cases are suitable for tendon grafting. In my opinion in no case ought the operation to be performed until an attempt has been made to cure any contraction of *fascia*—e.g. cavus or plantaris; or contraction of *tendon*, e.g. talipes equinus in equino-valgus—by tenotomy. Every case, therefore, of simple or compound talipes equinus is unsuitable for tendon grafting in that condition. The essential element in this operation is the presence of a healthy muscle, and therefore every case of flail joint, where no such muscle exists, is unsuitable. Such a joint is best treated by arthrodesis. For tendon grafting, therefore, the paralysis should not be too extensive, in other words should affect only one or parts of two groups of muscles, and the most satisfactory cases are those of talipes calcaneus, calcaneo-valgus; or valgus. For the first, both peronei are added to the tendo Achillis; for the second, the peroneus longus into the tibialis posticus and peroneus brevis into the tendo Achillis; and for the third, the peroneus longus into the tibialis posticus, supplemented by one of the six methods of strengthening the tibialis anticus.

It may be laid down as a general rule that in selecting a muscle to implant, the one should be chosen whose action is most nearly allied to that of the paralysed muscle, not only because such a muscle would necessarily be near at hand, but because by this selection restoration of voluntary function is the more readily obtained. In certain cases, however, it is of advantage (for example in cases of valgus) to take one of the antagonistic peronei and implant it on to the paretic tibialis posticus. This procedure acts in a twofold manner by strengthening the tibialis posticus, which, being weak, allowed the valgus to develop, and by weakening the peronei, which, being unopposed, contracted and directly caused the valgus. The use of antagonistic muscles must, however, be adopted with care. It must be remembered that we take from one side and give to the other, and that we run risk therefore of producing the opposite deformity; for example, talipes varus may replace valgus if both peronei have been displaced from their normal position behind the external malleolus.

The technique of the operation will vary slightly with the special deformity, but certain rules may, I think, be laid down with advantage.

1. All cavus, equinus, spasm, and shortening of tendons ought to be previously cured by tenotomy or other means as far as possible.
2. The limb ought to be prepared with the very strictest attention to aseptic cleansing with soap and water, and ether and spirit solution of carbolic acid.
3. The tendons should be disturbed as little as possible.
4. The parts exposed should be kept warm by using warm antiseptic lotion, say 1 in 100 carbolic, during the operation.
5. As large an area of each tendon as possible should be denuded of tenosynovial membrane.
6. The tendons should be firmly united together.
7. The wound should be dressed antiseptically and the foot immobilised for two or three weeks.

The method of attaching the tendons to each other is of great importance, for unless they are firmly joined together the benefit of the operation is liable to be lost. Tendons being practically non-vascular, do not unite so readily or so firmly as other tissues, and therefore it is imperative that a large surface of one tendon should be applied to a large raw surface of the other. With this object in view it is well, for instance, before transplanting the peronei to divide the tendo Achillis longitudinally, so that the rawed peronei tendons lie between two flaps of the tendo Achillis.

There are several untoward results which may follow this operation:—

1. Over-zeal in weakening the antagonists may result in the opposite deformity; care, judgment, and experience are requisite therefore.
 2. Sloughing of the tendons themselves from excessive manipulation.
 3. Suppuration of the wound, resulting in necrosis of tendons, or failure of the apposed tendons to unite;
- and 4. Recurrent stitch abscesses from defective suture material.

The cases in which sloughing has occurred have been those where the tibialis anticus, peroneus tertius, and extensor tendons at the ankle have been transferred, cut, and otherwise mutilated. In order to avoid this accident, Goldthwait has in one case operated upon a marked valgus case, due to paralysis of the tibialis anticus, by thoroughly exposing and then approximating the common extensor and anterior tibial at the lower

end of their muscular bellies by an incision three inches in length. The attachment was made at the lower portion of the muscle, and in such a way that a portion of the tendinous expansion was included in the sutures. The result, however, was not very encouraging.

The occurrence of suppuration and stitch abscesses is a very real and fairly frequent accident. Many of the recorded cases failed to heal by first intention. The first two cases upon which I myself operated suppurated, in my opinion as a consequence of a septic suture material, kangaroo tendon. One of the most important points to determine therefore is, what is the best material wherewith to suture the tendons together? There are four requisites for a perfect material; viz., that it should be strong, and aseptic, and absorbable, and non-irritating. There are five materials in common use; viz., silkworm gut, silk, catgut, kangaroo tendon, and silver wire.

Of these, *silver wire* is aseptic and strong, but is not readily absorbable. The only occasion where thin silver wire might with propriety be used is in suturing fairly large tendons, e.g. peronei to tendo Achillis.

Kangaroo tendon is strong, absorbable, non-irritating, but is rarely antiseptic, and is, in my opinion, to be condemned.

Silkworm gut is always absolutely sterile; it is strong, it is non-irritating. I have known a silkworm-gut suture to lie snugly stowed away in a knee joint for nine months, causing no sort of abscess or discomfort. Silkworm gut is, however, non-absorbable, and sooner or later must be removed. Its use, therefore, is not to be recommended as a suture material for tendons.

Silk is strong. It can be made sterile by boiling; but it must be used directly from a sterile solution. It readily absorbs germs and ptomaines, and readily, therefore, ceases to be absorbable, becoming irritating and giving rise to abscess after abscess, until every part of the silk has been extruded.

A disastrous result of the use of silk is at present under my care. The boy has infantile paralysis of both legs. The left is paralysed from the hip downwards. The right foot is only equino-valgoid. The parents had heard of tendon grafting, and wished me to unite the tibialis anticus to the extensor proprius pollicis. I advised them that in my opinion it was not necessary. They took the child abroad, where the surgeon divided the tendo Achillis on the right foot, and subsequently united the sartorius muscle of the left leg, which was active, to the quadriceps extensor, which was absolutely paralysed, by means of thick silk. The wound healed well; but some weeks

afterwards induration set in, and abscess after abscess has resulted. Two long pieces of silk ligature have so far worked out or have been removed, and at the present time the front of the leg is riddled with sinuses, from one of which there projects a piece of ligature, the deep attachment of which is firm. Silk, therefore, is not the best material.

Catgut, fairly thick, is what I myself shall use in future. Dr. Bulloch, the bacteriologist of the London Hospital, has shown that it is possible by the methods we employ in the operating theatre at the London Hospital to render catgut of every thickness absolutely aseptic. Thick catgut is strong, non-irritating, and absorbable. Catgut, therefore, is in my opinion the only ligature which fulfils all the conditions required of a material for ligature. By the use of aseptic catgut, I feel sure that the cases of sloughing of tendons and of suppurations and of stitch abscesses will be few.

In speaking of silk, I had occasion to refer to a recent extension of the operation of tendon grafting; viz., the implantation of a healthy sartorius into a paralysed quadriceps. It is to Goldthwait of Boston that we owe this advance. When, owing to paralysis of thigh muscles, the sartorius is unopposed the hip and knee are flexed, the thigh becomes abducted and rotated out. Transference of the sartorius to the centre of the quadriceps cures the abduction and rotation of the limb outwards, and transforms that force into the quadriceps. Five cases are recorded by Goldthwait in the American Orthopædic Association's *Transactions* of 1897. In three of these marked benefit was reported; in the other two he had reason to think the suturing (kangaroo tendon) was insecure. The three were all cases of flail knee joints. Of the first it is recorded:—"Has always used a crutch; after operation can extend and hold out extended leg, can walk without crutch or instrument." Of the second it is stated that "five months after operation, extension of the knee almost complete, can hold the leg out; improvement progressing."

In the case of which I have personal knowledge, there is certainly some voluntary power over the knee joint which did not exist before.

The operation is performed as follows:—An incision six inches long vertically along the inner side of thigh and patella. The sartorius is exposed and divided near the patella. The quadriceps tendon is then exposed and vertically slit, and through this slit the sartorius is passed from the inner side and sutured with kangaroo tendon to each edge of the quadriceps tendon. Plaster of Paris or a long splint is applied in

order to fix the hip and knee joints. Recumbency for two weeks is imperative. The sartorius is said to undergo remarkable development. The circumference of the leg will increase by half an inch. This operation seems to me to be one which will be more extensively resorted to ere long.

In the absence of the writer, no discussion was held on this paper, which the CHAIRMAN characterised as a most interesting one, which covered the whole ground.

The meeting terminated with a vote of thanks to the Committee of the Hospital for the use of their Board-room.

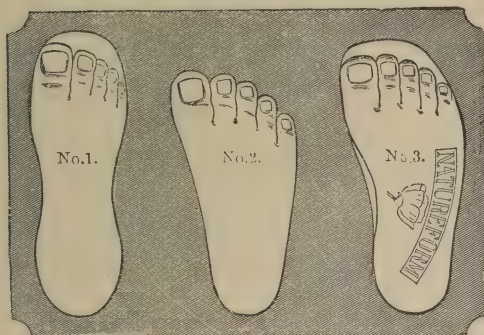
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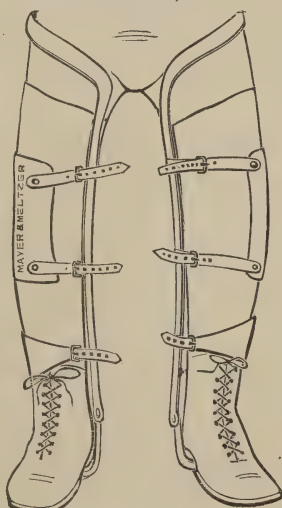
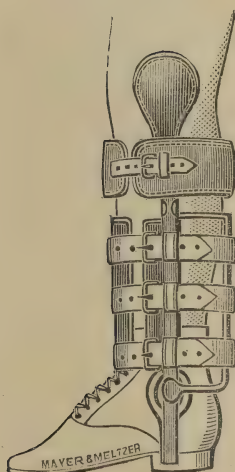
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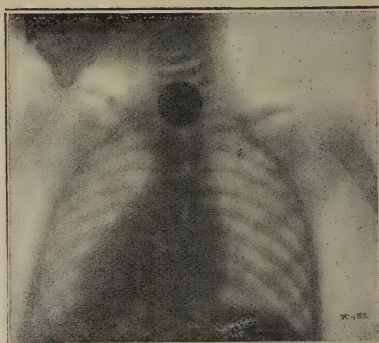
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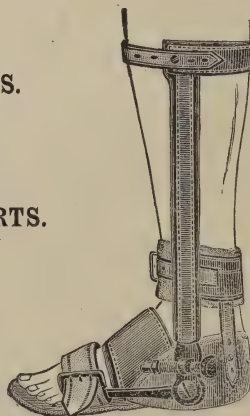
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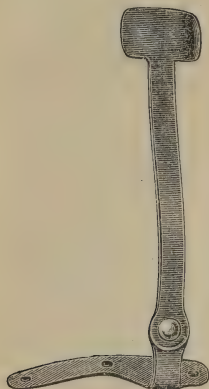


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